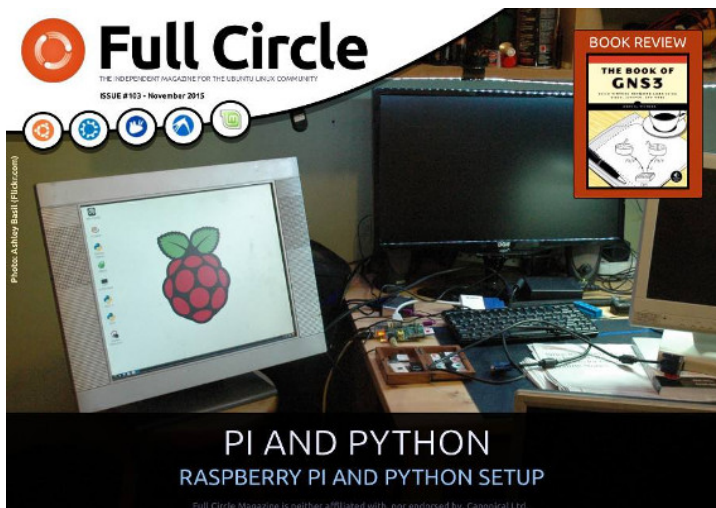


Full Circle Magazine



Issue #103

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Welcome to another issue of Full Circle.

Both Greg and Elmer return this month (for Python and LibreOffice respectively) and are joined by John who returns with another LaTeX article. The fourth article isn't really a HowTo, but I wanted to include it anyway so that you programmers out there can have some fun throughout December. It's an article on advent programming. In other words; a daily challenge from the first of December through to the 24th (Christmas Eve).

This month Charles touches upon 3D printers. This is something I plan on covering from next month onwards as I've just taken delivery of a RepRapPro Fisher 1. This printer was previously sold in 'beta', but now it's in v1.0 and I'll be discussing the build and software in the coming months.

As I write this the latest Ubuntu phone update (OTA-8) is being rolled out. This is the last update of 2015. The next one, OTA-9, will be due for delivery near the end of January. And all you Russian readers will be happy to hear that the BQ E5 is now available to buy in Russia and comes with special Russian scopes pre-installed. Enjoy!

I also have a couple of books here that I need to plough through to get reviews written up. One is 'How Software Works', and the other is 'The Maker's Guide to the Zombie Apocalypse'. Oh, and I also have another book review for next month too.

All the best, and keep in touch!

Ronnie

ronnie@fullcirclemagazine.org

NEWS



Snappy Ubuntu 16.04 LTS Will Support Nvidia and AMD Drivers, Says Mark Shuttleworth

Remember when we told you, guys, that Mark Shuttleworth, founder of Canonical and Ubuntu Linux, the world's most popular free operating system, said that Snappy Ubuntu Core 16.04 LTS would support private snaps?

Well, today we have more excellent news for all of you who use the Snappy Ubuntu Core operating system on embedded and IoT devices. Mr. Shuttleworth has stated in a recent email on the Snappy Core mailing list that the upcoming Ubuntu Snappy Core 16.04 LTS (Xenial Xerus) operating system will support proprietary graphics drivers.

When asked by Dan Kegel if Snappy Ubuntu Core has support for high-performance OpenGL graphics drivers, such as the proprietary ones from Nvidia and AMD, as

well as those from Intel, Mark Shuttleworth immediately replied that they would all be supported in the 16.04 LTS release of the operating system.

Source: <http://linux.softpedia.com/blog/snappy-ubuntu-16-04-lts-will-support-nvidia-and-amd-drivers-says-mark-shuttleworth-495462.shtml>

Submitted by: **Arnfried Walbrecht**

Old, not obsolete: IBM takes Linux mainframes back to the future

IBM introduced several significant new elements for its Linux server stack last month: support for KVM on its z Systems mainframes, Linux-only models in both the z Systems and Power Systems ranges, and a new purchasing model. The most technically interesting new development is mainframe support for KVM, the Linux kernel's built-in hypervisor. Although this is just a new way to access facilities that existing IBM products offer, it may help drive migration of x86 workloads onto IBM's highest-end kit.

Big Blue's big iron already has rich virtualisation offerings. At the lowest level, the PR/SM facility splits each machine's resources into multiple logical partitions (LPARs), each appearing as a separate machine with a portion of the host's processing and storage capacity. Even if the machine's configured as a single unit, it's really one LPAR.

Source: http://www.theregister.co.uk/2015/11/02/ibm_linux_mainframes/

Submitted by: **Arnfried Walbrecht**

How Will the Big Data Craze Play Out?

What happened in 2011? Did Big Data spontaneously combust? Was there a campaign of some kind? A coordinated set of campaigns?

Though I can't prove it (at least not in the time I have), I believe the main cause was "Big data: The next frontier for innovation, competition, and productivity", published by McKinsey in May 2011, to much fanfare. That report, and following ones by McKinsey, drove publicity in Forbes, The Economist, various O'Reilly pubs, Financial Times and many others—while providing ample sales fodder for every big vendor selling Big Data products and services.

Among those big vendors, none did a better job of leveraging and generating buzz than IBM. See Resources for the results of a Google search for IBM + "Big Data", for the calendar years 2010–2011. Note that the first publication listed in that search, "Bringing big data to the Enterprise", is dated May 16, 2011, the same month as the McKinsey report. The next, "IBM Big Data - Where do I start?" is dated November 23, 2011.

Source: <http://www.linuxjournal.com/content/how-will-big-data-craze-play-out>

Submitted by: **Arnfried Walbrecht**

Microsoft and Red Hat Reach Linux Deal

Microsoft Corp. and Red Hat Inc., longtime rivals from conflicting camps of the software industry, plan to collaborate in the cloud. The companies are announcing a partnership Wednesday to make Red Hat's version of the Linux operating system available to users of Microsoft Azure, the software company's cloud service.

Under the deal, Microsoft agreed to designate Red Hat's

Linux as its “preferred” option for enterprise-style computing jobs on Azure. In addition, personnel from both companies will work together in Redmond, Wash.—Microsoft’s hometown—to offer technical support to customers.

No financial elements of the deal are being disclosed.

Source: <http://www.wsj.com/articles/microsoft-and-red-hat-reach-linux-deal-1446642000>

Submitted by: **Arnfried Walbrecht**

OmniRAT Lets Hackers Control Android Phones, Windows, Mac, and Linux PCs

RAT stands for Remote Access Trojan (some use the term Tool as well) and refers to a particular piece of malware that infects user computers via a client component, which then starts communicating with a server counterpart. This allows an attacker to steal data from a target, spy on the user, and even take control of the victim's device.

Unlike previous Android RAT kits, OmniRAT comes with built-in support for controlling desktops, something that its competitors don't have the ability to do. Additionally, also compared to its competition, OmniRAT is also ten times cheaper to purchase, being offered for sale at prices between \$25 and \$50 (€23 and €46).

Software like this is not illegal, mainly because it is also used by programmers and testers in their daily jobs. RATs become illegal when someone uses them for malicious purposes.

Around mid-August this year, Avast detected one of these malicious campaigns in action, one that involved a version of OmniRAT, spreading via SMS messages.

Source: <http://news.softpedia.com/news/omnirat-lets-hackers-control-android-phones-windows-mac-and-linux-pcs-495779.shtml>

Submitted by: **Arnfried Walbrecht**

The kernel of the argument

For Linux, the operating system that Torvalds created and named after himself, has come to dominate the exploding online world, making it more popular overall than rivals from Microsoft and Apple.

But while Linux is fast, flexible and free, a growing chorus of critics warn that it has security weaknesses that could be fixed but haven't been. Worse, as Internet security has surged as a subject of international concern, Torvalds has engaged in an occasionally profane standoff with experts on the subject. One group he has dismissed as "masturbating monkeys." In blasting the security features produced by another group, he said in a public post, "Please just kill yourself now. The world would be a better place."

Source: <http://www.washingtonpost.com/sf/business/2015/11/05/net-of-insecurity-the-kernel-of-the-argument/>

Submitted by: **Arnfried Walbrecht**

Mentor Graphics Announces Customizable, Secure End-to-End IoT Solution with Integrated Gateway, Cloud and Edge Devices

Mentor Graphics Corporation announced the availability of its customizable edge-to-cloud IoT solution that enables companies to get its product to market quicker while helping to reduce risk, cost, and

development cycles. The Mentor IoT solution comprises a unique customizable IoT gateway System Design Kit (SysDK), a cloud backend, and runtime solutions on which to build an array of IoT edge devices. It enables IoT requirements with support from 8-bit microcontrollers to 64-bit microprocessors, and deployments of 100,000+ gateways each supporting dozens of edge devices.

To provide customers flexibility in meeting business needs, the technology can be licensed commercially as an end-to-end solution or in parts to address and complete a customer's existing solution. Additionally, Mentor Graphics can deploy and manage the solution as a service to customers. Both options are available today.

Source: <http://www.arcweb.com/Blog/Post/859/Mentor-Graphics-Announces-Customizable,-Secure-End-to-End-IoT-Solution-with-Integrated-Gateway,-Cloud-and-Edge-Devices>

Submitted by: **Arnfried Walbrecht**

Latest TPP leak shows systemic threat to software freedom

On March 25th, 2015, Wikileaks released a leaked chapter of the ongoing Trans-Pacific Partnership (TPP) negotiations, the multinational trade agreement that is being developed through a series of secret negotiations and aims to create a host of new restrictions. We here at the FSF have been fighting against TPP for years, as it represents the threat of a world dominated by DRM, software patents, and perpetual copyright.

The latest leaked chapter on investments lays out changes to a system of supra-national courts known extrajudicial investor-state dispute settlement (ISDS) tribunals. For years, these courts have enabled large

companies to sue democratically-elected governments over policies that these corporations oppose. For example, Big Tobacco has used the system to block or obstruct health laws intended to reduce smoking in countries around the world. While all of this is bad news in general, one provision in the leaked document presents a particular threat to software freedom. Holders of copyright, patent, and other proprietary interests are now included in the definition of "investor." Given the destructive nature of these provisions, the fact that proprietary developers could use them to interfere with local government protections of users' rights is cause for alarm.

Source: <https://www.fsf.org/blogs/licensing/latest-tpp-leak-shows-systemic-threat-to-software-freedom>

Submitted by: **Arnfried Walbrecht**

New encryption ransomware targets Linux systems

The antivirus software company Doctor Web has issued an alert about a new form of crypto-ransomware that targets users of Linux-based operating systems. Designated as "Linux.Encoder.1" by the company, the malware largely targets Web servers, encrypting their contents and demanding a ransom of one Bitcoin (currently about \$500).

Many of the systems that have been affected by the malware were infected when attackers exploited a vulnerability in the Magento CMS. A critical vulnerability patch for Magneto, which is used to power a number of e-commerce sites, was published on October 31. Doctor Web researchers currently place the number of victims in the "at least tens" range, but attacks on other vulnerable content management systems could increase the number of victims dramatically.

In order to run, the malware has to be executed with administrator-level privileges. Using 128-bit AES crypto, the malware encrypts the contents of all users' home directories and any files associated with websites running on the systems. It then goes through the whole directory structure of mounted volumes, encrypting a variety of file types. In each directory it encrypts, it drops a text file called READMEFORDECRYPT.txt. This demands payment and provides a link to a Tor "hidden service" site via a Tor gateway.

Source: <http://arstechnica.com/security/2015/11/new-encryption-ransomware-targets-linux-systems/>
Submitted by: **Arnfried Walbrecht**

Linux Foundation Launches Open Source High-Performance Computing Group

The Linux Foundation, a nonprofit organization that promotes the Linux kernel and other open source projects, has partnered with Dell, HP Enterprise, Intel, Fujitsu Systems Europe and a number of university research labs to create the OpenHPC project. The collaboration will center on four main goals: Producing a stable environment for testing HPC software

Creating an open source framework for HPC environments that will reduce costs
Developing a sophisticated HPC software stack suited to a variety of applications

Building a configuration framework that offers developers and users flexibility to tailor HPC software to meet their needs.

The time is right for new investment in open source HPC software because such software is vital in fields like

meteorology, astronomy, engineering and nuclear physics, yet it has not been developed in a central, efficient way, according to the Linux Foundation.

Source:<http://thevarguy.com/open-source-application-software-companies/linux-foundation-launches-open-source-high-performance-co>

Submitted by: **Arnfried Walbrecht**

'Smaller than a credit card': Tiny supercomputer could mean self-flying drones

"With NVIDIA's new machine learning module, companies will be able to specifically identify construction vehicles, building materials and other structures, so they'll have even more relevant information to manage their job sites using commercial drones".

As a result, the platform is capable of performing complex tasks such as recognizing images, processing conversational speech, or analyzing a room full of furniture and finding a path to navigate across it. Nvidia described the Jetson TX1's machine learning abilities as "a groundbreaking technology that will give autonomous devices a giant leap in capability".

NVIDIA would like us to think that its newly announced Jetson TX1 is a few sort of AI upgrade for computers and networks, one built to aid autonomous systems by enabling machine learning.

Source:<http://heraldvoice.com/2015/11/15/smaller-than-a-credit-card-tiny-supercomputer-could-mean/>

Submitted by: **Arnfried Walbrecht**

Linux 4.4 glimpses the future with its first release candidate

LINUX IS already past the point when, in theory, Skynet should have created a T-800 Terminator to save John Connor, and Linux puppetmaster Linus Torvalds has released the first release candidate for kernel version 4.4.

"Just looking at the patch itself, things look fairly normal at a high level, possibly a bit more driver-heavy than usual with about 75 percent of the patch being drivers, and 10 percent being architecture updates," said Torvalds in a release statement.

"The remaining 15 percent is documentation, filesystem, core networking (as opposed to network drivers), tooling and some core infrastructure." He also explained that driver changes for staging, networking and GPU drivers account for 40 percent of the entire kernel patch.

Around half of the content is aimed at ARM-based architecture, while x86 and others make up the other half.

The change list is, as ever, phenomenal in size, but includes a number of improvements for IoT support for ARM processors and updates for DRM.

As ever with Linux kernels, there's a long cycle of merges and commits before these release candidates become final, and there are likely to be up to 10 release candidates before the real deal is released sometime next year.

Source:<http://www.theinquirer.net/inquirer/news/2434899/linux-44-glimpses-the-future-with-its-first-release-candidate>

Submitted by: **Arnfried Walbrecht**

**Freescale Makes Significant Investment in Real Time
Linux**

Freescall has just announced they are joining the Real Time Linux (RTL) Collaborative Project as a Gold Member. Freescall joins Google, National Instruments, OSADL, and TI with a significant investment because they value the strategic importance of this open source project and the benefits it creates for their customers.

Linux adoption for embedded applications is following a similar path to what we saw in mobile, where smartphones and their apps drove new experiences and even further commercial success of Linux (via Android) in the marketplace. In the case of embedded systems, advances in artificial intelligence, image and voice recognition are sparking massive innovations based on the power, flexibility and cost advantages of embedded Linux systems. For example, in drones and cars we are seeing a convergence of advanced image recognition and artificial intelligence giving way to pilotless and driverless navigation. From robotics, to drones, to cars, a real time Linux kernel is key to the foundation of these soon-to-be commercially available solutions.

Source:<http://www.linux.com/news/featured-blogs/204-mike-woster/867455-freescale-joins-real-time-linux-project-as-gold-member>

Submitted by: **Arnfried Walbrecht**

Numecent raises \$15.5M to bring cloudpaging to Android and Linux

Irvine, California-based software company Numecent said today it has raised a new round of \$15.5 million from a broad range of European investors as the company seeks to expand its cloud-based services beyond Windows.

The series B round includes \$4.5 million from Deutsche Telekom, with the rest from “European industrialists,

family offices and private equity firms,” according to Numecent. Deutsche Telekom also led the company’s series A round.

“Numecent is on a good trajectory and is receiving traction from major players in the industry,” Vicente Vento, chairman of the supervisory board of Deutsche Telekom Strategic Investments in a statement. “This traction validates the view that cloudpaging is potentially transformative not only for IT, but also for emerging sectors like IoT.”

Source:<http://venturebeat.com/2015/11/17/numecent-raises-15-5m-to-bring-cloudpaging-to-android-and-linux/>
Submitted by: **Arnfried Walbrecht**

Texas Instruments – Kit enables fast and easy Linux software and hardware development

The OMAP-L138 DSP + ARM9 development kit, from Texas Instruments (TI) is designed to enable fast and easy Linux software and hardware development. The scalable platform can ease and accelerate software and hardware development of everyday applications that require real-time signal processing and control functional, including industrial control, medical diagnostics and communications.

The low-cost kit, complete with freely downloadable and duplicable board schematics and design files, greatly reduces design work. A wide variety of standard interfaces for connectivity and storage allow developers to easily bring audio, video and other signals onto the board. Expansion headers such as LCD screen expansion headers and Leopard Imaging’s camera sensor allow users to extend the board’s functionality.

The TMDSLCDK138 replaces the TMDXLCDK138 with the same performance, price and features. It available on a limited quantity basis as inventory ramps, says the company.

The LCDK does not have an onboard emulator. An external emulator from TI (such as the XDS100, XDS200, XDS510, XDS560) or a third-party will be required to start development.

Source:<http://www.electropages.com/2015/11/texas-instruments-kit-enables-fast-easy-linux-software-hardware-development/>

Submitted by: **Arnfried Walbrecht**

Linux Smartphones with Open Source Ubuntu OS Go on Sale in Russia

Ubuntu Linux fans in Russia have a new way to run Canonical's open source operating system this week following the announcement that BQ Aquaris smartphones have gone on sale in the Russian market.

BQ will offer two Ubuntu-based phones in Russia. The Aquaris E5 Ubuntu edition is available already and its Aquaris E4.5 Ubuntu edition will go on sale at an unspecified date in the near future.

The phones will be sold through local Russian distributors for prices ranging between the equivalent of about 192 and 235 U.S. dollars.

This is an important step forward in Canonical's plan to make Ubuntu a formidable force in the market for smartphones and other mobile devices. Source:<http://www.electropages.com/2015/11/texas-instruments-kit-enables-fast-easy-linux-software-hardware-development/>

Submitted by: **Arnfried Walbrecht**

Linux Debugging Comes to Visual Studio

Microsoft has released a preview of its new Visual Studio GDB extension, contributing to their ongoing effort to make Visual Studio support as many development environments as possible. Microsoft's Marc Goodner has provided details of this new ability, which can be used with Visual Studio 2015 Community edition or higher.

Once installed, this extension provides a new Project target under Visual C++ -> Cross Platform called "Makefile Project (GDB)". Once created, an SSH client will be needed on your local/host Windows machine to enable communication. As Goodner explains, certificates have to be generated to enable secure communication but do note that pass phrases cannot be used at this time so it probably makes sense to generate a separate certificate just for this purpose. You will also want to make your first connection using your SSH client outside of Visual Studio so the certificate can be accepted. Subsequent connections can then be made within Visual Studio.

Source: <http://www.infoq.com/news/2015/11/vs-gdb>
Submitted by: **Arnfried Walbrecht**

Parrot's Bebop 2: smaller, faster, longer-lasting, Linux-fortified

In San Francisco, Parrot unveiled a smaller, faster, longer lasting version of its Linux-based Bebop drone, helping to solidify its dominance in the mid-range consumer market. One of the key new features is an emergency cutoff that instantly kills the quadrotor motors when a blade hits an obstacle. The increasing focus on safety was also demonstrated this week when 3DR (Solo) and DJI (Phantom) announced similar new technology to

make it easier for their customers to avoid restricted airspace . France-based Parrot was an early leader in consumer unmanned aerial vehicles (UAVs) with its AR.Drone quadrotors, which bridged the gap between the toy and prosumer/commercial markets. Parrot also owns a big chunk of the toy drone and robot market with products like the Rolling Spider and Jumping Sumo, as well as a newer line of Jumping, Airborne, and Hydrofoil mini-drones, selling from \$145 to \$220.

Source:<http://linuxgizmos.com/parrots-bebop-2-smaller-faster-longer-lasting-linux-fortified/>
Submitted by: **Arnfried Walbrecht**

Arduino Meets Linux: Arduino Introduces Its 3rd Generation Platform

The Arduino platform's simplicity, open architecture and ease of use helped make it the most popular embedded development tool within the Maker community. In this article, we will look at the new Linino framework, which makes it possible to seamlessly integrate Linux into the Arduino platform as well as some of the boards, protocols and development tools that can support advanced functionality, such as real-time control of multiple functions, IoT applications and integration of cloud-based services.

Now, a third generation of Arduino boards is emerging that contains two processors. 3rd-gen boards such as the Arduino Yun have an embedded microcontroller (MCU) and a more powerful microprocessor Unit (MPU), similar to those found in PCs and mobile devices. The MCU (typically an Atmel ATmega32x device) supports the real-world I/O functionality traditionally handled by the Arduino platform. The MPU is typically based on the MIPS architecture (such as the Atheros AR9331) and

powerful enough to support application languages such as C/C++, Python and Java. The microprocessor can also support multiple communication protocols (Wi-Fi, TCP/IP, HTTP etc) and web-based services (Chat, e-mail, Twitter, AllJoyn etc).

Source:<http://electronics360.globalspec.com/article/5995/arduino-meets-linux-arduino-introduces-its-3rd-generation-platform>

Submitted by: **Arnfried Walbrecht**

Command & Conquer

Static Site Generation

Lucas Westermann

Last month, I wrote about Ubuntu Phone, intending to follow up on it this month. Unfortunately, I've lacked the time to complete the article for this issue – you can expect it to be in next month's issue. Instead, I'll discuss a new website creation tool called 'static site generation'. If you're not interested in websites, and want to learn more about Ubuntu Phone programming, check back next month!

What is static site generation?

Static site generators are command-line tools that can take content from formats such as markdown and reStructuredText, and insert the content into HTML templates. At the most basic, you can think of it as a content management system that, when compiled, doesn't save content to a database, but straight into a static html page.

But... why?

Anyone who has had to work to optimize a page for performance knows that static sites load much faster (and with less effort), because there is no delay while querying the database, or while running for-loops to insert information. Naturally, some sites lend themselves to content management systems (really large sites, sites with various editors and moderators, or sites that need to serve dynamic content). As is always the case in web design, it's a matter of picking the right tool for the job, in order to

create the site as fast as possible, to have it perform well, and to avoid reinventing the wheel at every turn.

But my CMS site loads quickly?

It's possible to have a site load very quickly when being used with a CMS, but this is generally the result of a great deal of testing, and plenty of performance tweaks.

A comparison

Note: According to studies by Google, any site that takes longer than 1 second to load (on mobile, mainly) will generally have users leave due to the wait. Studies from Amazon and Google also saw that an increase of loading time of 1 second (say, for example, from 400ms to 1.4s) could result in a drop of revenue between 14 and 18%.

A site I am working on was originally created using Django CMS - where it would load in about 612ms from my local machine (with no network latency, a quad core CPU, and an SSD), which is perfectly reasonable. Shifting it to an Nginx server running uwsgi saw the load times jump up to 700-800ms. However, the more content that was added to the page, the longer it would take. Version 3.2 of Django CMS seems to have improved on the speed, but it is not, as of writing, at a final release. The equivalent site using Pelican (a static site generator) loads in 402ms, and the only optimization I have done so far is to merge my CSS files. There is no compression of any sort running, and is being served only with python http.server. As the site is a redesign for my own company, and I will be the only one managing it, I have no need for a CMS - I could just as easily write the HTML by hand. However, the number of pages make it unreasonable to create everything by hand, which is where Pelican comes in. I can manage my content easily in reStructuredText

(or, theoretically, anyone who knows Markdown, HTML, or reStructuredText), and can assign various templates to the pages, according to the meta information. The resulting static site can be hosted easily and quickly on Nginx, and use less resources than a Django CMS setup running Nginx, uwsgi, and postgresql. Note: this is not a criticism of Django CMS, as I could probably optimize my approach in order to reduce load times. A static site generator simply reduces the amount of optimization I need to accomplish.

I'm sold! Where do I start?

There are various static site generators on offer. The most common and well-known is Jekyll, which is used for GitHub Pages, among other things. Jekyll uses the Liquid templating language, and is written in Ruby. I, however, am currently using Pelican, and for two main reasons:

1. It uses Jinja2 for templating, which is the same as Django. Meaning I could carry over existing templates quickly.
2. It is written in Python, and so has integrated translation options for multilingual sites (using Jinja2 i18n). As my site is always in English and German, this was a big factor for me.

So, depending on what you're most comfortable with, you may prefer Jekyll over Pelican, or a number of other static site generators over either. Use what you're comfortable with, as it will help cut down the learning curve. If you want to use plugins for automatic integration of bootstrap (for example), then I would recommend checking the plugin options before choosing a generator.

Does this mean I can't use forms, or any dynamic content at all? Forms are essentially just HTML that gets sent via POST (typically) to a php file. If you use a

combination of Nginx and apache (or just apache), you can still include a php file for sending the information around. Depending on what you mean by dynamic content, it should be possible too. iFrames or widgets from other sites shouldn't be an issue, or, if you want to semi-dynamically create a grid (for example), you can create templates using for-loops to iterate through information in order to insert it into HTML. If you're looking for login areas and personalized HTML, a CMS will probably be easier for this.

Okay, I've installed a generator. What now?

Now would be the time to check the homepage and view the documentation. As each generator has a slightly different file structure, and different commands to compile, it's necessary to check the documentation. Once you've created a project (most likely done with a quickstart command), then it's time to create some sample content, and a template (or to adjust an existing template).

My site is done...do I have to buy hosting?

Since static HTML is so easily served, there are some offerings where you can upload a site without much trouble. For example, GitHub Pages. Technically, you could even host it in some fashion on Dropbox. So, depending on your needs, you may not need to pay for additional hosting - or if you do, you'll most likely not need too powerful a server to adequately serve the content.

Should I optimize?

Depending on how quickly your site loads, you may not feel you need to. My recommendation, at least, is to optimize images and enable server compression if your

site is going to be mobile-friendly. Assuming, of course, that you've minimized your CSS and JS already. You'll most likely not need to do every optimization you can for that last 3% decrease in size, but some basics are recommended.

I hope this article has been interesting for anyone looking at, or working on, a project where you keep thinking "this site is almost too small for a CMS, but too large for doing it by hand!". Or anyone interested in creating a quick project website for GitHub. If you have questions, suggestions, or comments, you can reach me at [lswest34 + fcm@gmail.com](mailto:lswest34+fc@gmail.com).

Further Reading

Jekyll homepage: <https://jekyllrb.com/>

Pelican: <https://github.com/getpelican/pelican>

Python in the REAL World - Part 61

By G.D. Walters

Welcome back to the new direction of my Python series. In case you missed last month, I am changing the direction of this 5 year series from teaching programming in Python to what is called Physical Computing using Python. When you see the phrase 'Physical Computing', think of buttons, LEDs, motors, sensors (temperature, humidity, motion sensors, barometric sensors, etc.) and more. The reason I decided to do this was that after 5 years, I thought I had shown pretty much everything that you needed for “normal” computing, so let's focus on what I consider the future of small computer programming and microcontrollers.

This month, I will be going over selecting a Raspberry Pi (yes there are more) that will fit your goals, installing an operating system onto the SD card and starting the RPi for the first time with the new OS.

Next month, we will start learning to respond to switches and control LEDs. In future articles, we will be interfacing with sensors and the Arduino micro-controller.

A brief history of the RPi

Much of this information comes from the official Raspberry Pi website (<http://www.raspberrypi.org>) and my memory of buying my first RPi. When the Raspberry Pi first came out, there were two models – Model A+ and Model B+. The decision tree was fairly easy since the two different versions fit a “simple or full feature” mindset, as you can see in the gross details presented below (They are now called RPi 1 Models)...

Raspberry Pi Model A +

256 MB Ram

One USB Port

40 GPIO Pins (original Model A only had 26 pins)

No Ethernet Port

Raspberry Pi Model B +

512 Meg Ram

4 USB Ports (original Model B only had 2 ports)

40 GPIO Pins (original Model B only had 26 pins)

Ethernet Port

In February 2015, both of those models were superseded by the RPi 2 Model B. It shares a good deal with the RPi 1 B +, but has a 900 MHZ Quad-core ARM Cortex-A7 CPU and 1GB Ram.

You can find various models of the RPi at any number of web retailers. My humble suggestion is to get the RPi 2 Model B if you can afford the difference in the price between the P1 Model B (it shouldn't be that much of a delta). Any of the code that we create in the next few articles should easily work with any version of the Rpi.

While you are searching the web for your RPi, you will see various kits and add-on modules like cameras, servo controllers, motor controllers and so on. At this point, the add-ons won't be needed, but we might use some in the future, so if it is something that you are interested in use your own judgment. As to the kits, here are some things you should consider before you invest in the "ultimate kits". In the next few articles, we will need :

- A Raspberry Pi computer.

- A power supply. For the P1 versions, a 5 VDC 1-1.2 amp cell phone charger with a micro USB connection (normal for many smart phones today) will work well. For the P2 version, I strongly suggest that you get a power supply that has an output of 5 VDC 2.5 amp power supply with a micro USB connector.
- A USB Keyboard and Mouse. While many places offer very small keyboard/mouse combos, for programming work and “normal” computer use, you will want a full size version of both. You can move to the small wireless versions later on if you decide to use the RPi for other uses like a multimedia centre or expanded home automation. Normally when I work with the Pi, I use a VNC server on the Pi and a VNC client on my linux machine, so I don't have to have multiple keyboards and mice on the top of my desk.
- A 4-8 GB SD Card that is Class 10. Versions P1 A and B used SD cards. P1 Model B+ and above have switched over to a Micro-SD card only support. Keep this in mind when buying a specific version. Of course you can use a bigger card. Officially they say that testing has been done with 32 GB cards and don't see many issues with most of the larger cards. **Please Be careful when buying SD cards, since they are not all created equal. Just because a cheap card is marked “Class 10” doesn't actually mean that it is going to work like a more expensive card.**
- Some sort of Internet connection, either USB Dongle or Ethernet cable.
- A HDMI monitor/television for output and HDMI cable. If HDMI is not available, the P1 A and B versions provide a RCA Composite Video out and 3.5mm Audio Out connector. The P1 B+ version and later have done away with the RCA Composite Video connector and has replaced it with a 3.5mm

jack that combines audio and video in one. You would need a 3.5 mm to 3 RCA connectors to connect to an older TV.

- Speakers or headphones (unless the monitor or device you are using supports HDMI audio).

While this is the “minimum” requirement list for this article, for our first project you **SHOULD** have the following items available...

- Breadboard – The breadboard will be needed to start working with add on discrete components like LEDs, resistors, switches, etc. without having to do any soldering.
- GPIO interface board (header) and Ribbon cable. This will connect the GPIO pins from the RPi to the breadboard. Check out <http://sparkfun.com> or <http://www.Adafruit.com> for this item. The item you will want to look at from Adafruit is called “**Pi T-Cobbler Plus**”. Note that this particular item will NOT work with the RPi V1A or B. It will only work with the later versions. It is currently about \$8.00 U.S.. If you are using a model A or B, you should get “Pi T-Cobbler” which is about \$7.00 U.S. If you are looking at SparkFun, their item is called the “Pi Wedge”. Unless you want to assemble your own (read this as soldering tiny parts), you will want to get the Preassembled version. This one costs about \$10.00 U.S.. I believe that they have retired (discontinued) the version for the RPi 1A and 1B. You CAN elect not to get the interface board and ribbon cable and use female (Pi side) to male (breadboard side) jumpers. These will work, however, in some of the things we do later on, if you get the jumper on the wrong pin of the Pi, it could lead to damage to your Pi.
- Various Resistors, LEDs and Mini pushbutton switches. I will give you a list before we need them

to give you plenty of time to obtain them. You can get these at many places.

- One other thing you might consider is a case, but only if you have the breakout boards and ribbon cables. This will protect your Pi from your handling of it.

Setup of your RPi

Now comes what must be for me, the most tedious part of the project... the setup. The steps we will perform are:

- Download the OS image.
- Unpack the image file from the archive file. Put it somewhere it's easy to get to.
- Installing OS to the SD Card.
- Getting the RPi hooked up.
- First boot of the RPi with the new OS.

So, let's get the OS image. Go to the downloads page on the official Raspberry Pi website (<https://www.raspberrypi.org/downloads>). You will be presented multiple versions of various images that you can download, including 2 versions of Ubuntu (The GUI version is Ubuntu Mate), Windows 10 IOT and more. If you have an older model (original models A or B), neither of the Ubuntu images or the Windows image will run on these models. You need the ARMV7 processor and the extra memory to be able to use these images.

The two we are interested in for this project, are the NOOBS and the RASPBIAN images. I will be using the RASPBIAN Wheezy image dated 05-05-2015 for our first few projects, but if you want to have the option of booting into other OS images on the same card, feel free to download the NOOBS image. Just remember, if you have more than one OS on the card, you have less space available to the RASPBIAN image and you will run into an

issue that I always used to, not enough space for all the things you want to try. Assuming that you are doing your work on a Linux machine, you can see the official installation instructions at <https://www.raspberrypi.org/documentation/installation/installing-images/linux.md>. If you are using a Windows machine or a Mac, follow the links there. I'm going to assume a Linux machine and will give you the instructions here.

Before we get started, you might be asking why, if there is a newer/better version available, am I using the older version. I've had some trouble with the 'Jessie' release and am more comfortable with the 'Wheezy' release at this time. I doubt that this was an issue with the release, probably just a bad download, but I just wanted to let you know. For the purpose of the next few articles, use 'Wheezy' and feel free to play with other versions.

Unpack the archive and have it be sent to a folder that will be easy for you to remember.

Installing the OS Image to the SD Card

If you are using an early version of the Pi, you will be using a standard sized SD card. If you are using a later version you will be using a Micro-SD card. To save me having to type the distinction every time, I will use "SD" in the documentation. One more thing before we start. I STRONGLY SUGGEST that you do not use a device connected to an external USB hub for the imaging of the SD card. I know the specs say you can, but I've never had very good luck doing this.

OK, here we go. Before inserting the SD card into your Linux box, open a terminal and do:

```
sudo -i
```

Most of the commands don't actually need the sudo

level permissions, but it won't hurt and neither you or I have to remember when they do. Now run “df -h” to see what devices are currently mounted in the system. My system responds as shown below. Yes, I've named my machine Slartibartfast.

```
Slartibartfast ~ # df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/sda1       451G  336G   93G   79% /
none            4.0K    0   4.0K    0% /sys/fs/cgroup
udev            3.9G  4.0K   3.9G    1% /dev
tmpfs           796M  1.5M   794M    1% /run
none            5.0M    0   5.0M    0% /run/lock
none            3.9G  124M   3.8G    4% /run/shm
none            100M   32K   100M    1% /run/user
/dev/sdd1       2.8T  2.5T   314G   89% /media/greg/TOSHIBA EXT
/dev/sdb1       1.8T  1.5T   294G   84% /media/greg/extramedia
/dev/sdc1       917G  681G   190G   79% /media/greg/MoreMedia2
Slartibartfast ~ #
```

Notice that I have 4 drives (sda1, sdb1, sdc1 and sdd1). I hope that when I plug in the SD card, it will come up as /dev/sde1. This will be important to know because if we get the wrong /dev/ device, we will corrupt it! Now plug your SD card into the computer and run “df-h” again. My system responds as:

```
Slartibartfast - # df-h
Filesystem      Size  Used Avail Use% Mounted on
/dev/sda1       451G  336G   93G   79% /
none            4.0K    0   4.0K    0% /sys/fs/cgroup
udev            3.9G  4.0K   3.9G    1% /dev
tmpfs           796M  1.5M   794M    1% /run
none            5.0M    0   5.0M    0% /run/lock
none            3.9G  124M   3.8G    4% /run/shm
none            100M   36K   100M    1% /run/user
/dev/sdd1       2.8T  2.5T   314G   89% /media/greg/TOSHIBA EXT
/dev/sdb1       1.8T  1.5T   294G   84% /media/greg/extramedia
/dev/sdc1       917G  681G   190G   79% /media/greg/MoreMedia2
/dev/sde1        56M   20M   37M   36% /media/greg/boot
/dev/sde2        30G   3.0G   25G   11% /media/greg/13d368bf-6dbf-4751-8ba1-
Slartibartfast - #
```

Thank goodness! However /dev/sde1 has two partitions. This will be important in the next step. If you

are me, please write down the drive information so you don't make a mistake. Now you will want to unmount the SD card drive.

```
Slartibartfast ~ # umount /dev/sde2
Slartibartfast ~ # umount /dev/sde1
Slartibartfast ~ # df -h
```

Notice that I started yet another “df -h” just to verify that the device is unmounted.

If you have ever used this SD card for anything before, you will want to remove the partitions before proceeding further. Some people might argue that this is not necessary, but why not? It only takes a few seconds and it keeps us from having problems. Use “gparted” to remove all the partitions.

We are about to write the Raspbian image to the SD card. There are two ways to do this. First is to use the “dd” command AS SUDO, which I'm sure will be the first thing that comes to everyone's mind. However, remember when we use “dd”, we don't get any information coming back to tell us what is going on and if it takes 5 minutes or longer to write the image, we won't see anything that entire time in the way of progress. While there are other methods I'm going to suggest that instead, you can use the “dcfldd” command. Once it gets started (which could take a minute or so) it will give a progress report about how much has been written. Pick your “weapon” of choice. I'm going to show “dcfldd”. Now, as SUDO, please change to where ever you have unpacked the image you are going to use.

```
Slartibartfast Raspbian # ls -al
total 7424016
drwxr-xr-x 2 greg greg      4096 Oct 31 12:02 .
drwxr-xr-x 3 greg greg      4096 Oct 23 20:11 ..
-rw-r--r-- 1 greg greg 3276800000 May  7 2015 2015-05-05-raspbian-wheezy.
-rw-r--r-- 1 greg greg 4325376000 Sep 24 16:14 2015-09-24-raspbian-jessie.
```

```
Slartibartfast Raspbian #
```

I show an “ls” command here. I do this so I can remember the name of the file that I'm just about to work with, and I have the exact spelling.

```
Slartibartfast Raspbian # dcfldd bs=4M if=2015-05-05-raspbian-wheezy.img o
768 blocks (3072Mb) written.
781+1 records in
781+1 records out
Slartibartfast Raspbian #
```

On my machine, the process took about 10 minutes total.

This next step is totally optional, but if you are like me, you want to verify the write so that you can be sure that this matches the image. We will make an image of the SD card we just did and write it to a temporary image file back to the hard drive. Since your SD card will likely be bigger than the one they used to create the distribution image, we will need to truncate our copy to match the size of the original and finally use diff to verify that both images are the same. Remember this could take a rather long time if you have a card larger than about 8Gb. I'm using a 32Gb card and it looks like it's going to take probably 30+ minutes to copy the image to the drive.

```
Slartibartfast Raspbian # dd bs=4M if=/dev/sde of=wheezy-2015-11-07.imgsaf
7609+1 records in
7609+1 records out
31914983424 bytes (32 GB) copied, 1675.51 s, 19.0 MB/s
Slartibartfast Raspbian # truncate --reference 2015-05-05-raspbian-wheezy.
Slartibartfast Raspbian # diff -s wheezy-2015-11-07.imgsafe 2015-05-05-ras
Files wheezy-2015-11-07.imgsafe and 2015-05-05-raspbian-wheezy.img are ide
```

As you can see, the images are the same, so if there is anything wrong from here until we log in, it's not our fault. This process could be a useful process as you go along and want to make a backup image of your Pi's “drive”, just in case something happens.

Finally, we want to run the sync command which will make sure that anything remains uncommitted in the write cache is flushed and that is ok to unmount the SD card.

Now we can move on to some more “exciting” things. Powering on the Pi.

Getting ready to power up your Rpi

Notice how I worded the heading for this portion of the instructions. There are certain things you should do before you apply power to your RPi. There are possibilities you can damage your RPi if you don't do the steps in order.

- Plug in the Keyboard and Mouse into the USB port/ports.
- Plug in the Ethernet cable into the Ethernet port or Wireless dongle into the USB Port.
- Switch on your monitor or TV and get it set to the proper mode (HDMI or Composite).
- Plug in the video cable (HDMI or Composite).
- Put the SD card (or Micro-SD card) into place. It doesn't matter if you are using a full size SD card or a Micro-SD, you will insert it with the label facing down, not up towards the bottom of the Pi. And whatever you do, **DO NOT remove the SD card while the RPi is powered on.**

At this point, we are ready to plug in the power, so take a deep breath and cross your body parts. Plug it in.

If it worked, then we'll move on. If not, please retry the instructions above.

Once you get Pi booted into a distribution for the first time, you will presented with the raspi-config application. We are going to want to tweak some of the settings. We

only really need to do this once.

You will see a screen with 9 options on it. We will work with numbers 1,3 and 4.

- Option #1 - Asks about expanding the file-system. You really want to do this so you can get the most space you can. It will take effect at the next reboot.
- Option #3 - Enable boot to Desktop/Scratch. You should go ahead and set this to Desktop Login as User 'Pi' at the Graphical Desktop.
- Option #4 – This sets various things that we take for granted by our automated setup systems. They include Locale, Timezone and Keyboard Layouts.

- First select Locale. Since this computer comes from the UK, its default is to select things that someone living there would need. I, on the other hand, need to change some settings. I have to let the window scroll down to EN_US.UTF-8 UTF-8 and select it. Follow the prompts and you'll be fine.

- Next I need to set my time-zone. Since I live in Colorado, USA, I would select America under the Geographic area, and Denver for the Time Zone.

Finally I have to select the keyboard layout I wish to use. It asks a lot of questions, so I would select “Generic”, “US”, “US”, “Default”, “No Compose Key” and “No” to Xserver Termination key.

Finally I'm ready to set it up, so I select “Finish” and “yes”. Your Pi should reboot and you should see the normal desktop. Now we want to update the system to the latest, add a couple of applications that we'll need right away and then let it reboot once again.

Open a terminal off the top menu bar and do:

```
sudo apt-get update
sudo apt-get dist-upgrade
```

Now we want to install TightVNCServer. While this is an optional step, I find it much more constructive to use the Remote window on my Linux desktop than be forced to have 2 monitors, keyboards and mice. It always gets me confused about what/where I am.

```
sudo apt-get install tightvncserver
```

Once that's set up, it will ask you to create a password, so no one can just jump into your screen. Make it easy for you to remember.

The very next thing we want to do is set the tightvncserver to automatically startup on boot. That way we don't have to have a mouse or a keyboard.

- Change to the home directory if you aren't already there. `$ cd /home/pi`
- Next, change to the .config directory. `$ cd .config`
- Now we will make a new directory here called 'autostart'. `$ mkdir autostart`
- Change to the autostart directory we just created. `$ cd autostart`
- Now create a new configuration file. `$ nano tightvnc.desktop`
- And enter the following lines:
[Desktop Entry]
Type = Application
Name = TightVNC
Exec = vncserver :1
StartupNotify = false
- Save the file (^O) and exit (^X).

Almost done now. The last thing we will need to do is

install the IDE we will be using for our code development, which is Geany.

```
sudo apt-get install geany
```

Move over to your normal computer and load VNCViewer software on it. Once that's all done, you will probably want to spend a moment or two by rebooting the computer and making sure that the VNC really did start up and connect. If everything works, you are done.

You will need (as I said earlier) a few things for next month. Some male to male jumpers, female to female jumpers, the breadboard, interface and cable and a handful of things from the electronics store...

- Some small LEDs. Try to get around 10 of each Red, Green, Yellow and Clear.
- Some small $\frac{1}{4}$ watt resistors. 220 ohm, 4.7K ohm, 10K ohm, and some other “normal” hobbyist resistors. About 10 each will do you and the salesperson at the local shop should be able to get you what you need.
- A couple of small switches (spst) that will fit on the breadboard. (usually comes with 4 pins).

Really that's about all you will need for the next article. In the meantime, enjoy playing with Linux on the Pi. I think you will be surprised by the power of this tiny device.

So until next month, the last thought I will leave you with is something we hear here in the U.S. all the time anymore....

“Just wait ... there's more!!!!!!”

LibreOffice, Part 54, Conditional Formatting

Elmer Perry

When you have some data to analyze, do you gather your data into a spreadsheet, format the sheet, and then stare for hours at the numbers wondering what they mean? No! You create a chart that represents the data. While a chart can help you see the overall results of the data, how do you examine how individual data-points fall into the overall scheme of things? Conditional formatting can help you focus in on the data-points making up your data set.

LibreOffice provides us with many different conditional formatting options, allowing us to find a setup that will work for many different types of data. We discussed one of the conditional methods back in part 43 under statistical functions (Full Circle 91). Today, I want to add three more conditional formatting options to your data analysis arsenal, Color Scales, Data Bars, and Icon Sets.

Methods of Calculation

In all three methods, you create a range or condition for your data. The range or condition is controlled by 6 different methods for calculating values. Let's look at each of the methods.

1. Minimum – The smallest value in the data set.
2. Maximum – The largest value in the data set.
3. Percentile – The percentile ranking of each value within the minimum to maximum range of the data points.
4. Value – The value is based off a fixed number you

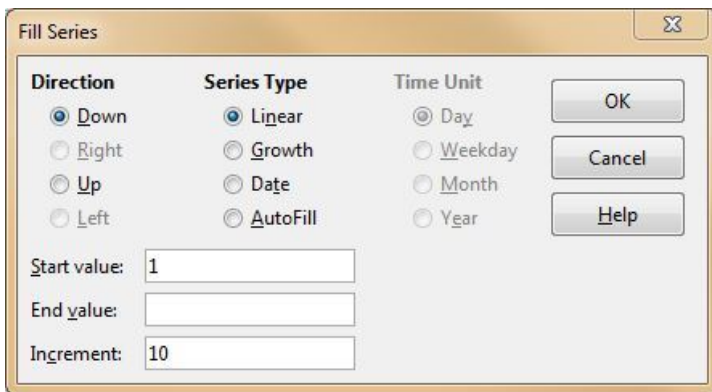
enter.

5. Percent – The part each value is of the total sum of the data set.
6. Formula – The value is set by a cell reference or a formula.

While percentile and percent may seem like the same thing, mathematically they are different. A percentile breaks the difference between minimum and maximum into 100 pieces and reports where the values fall in those 100 pieces. A percent shows how much the value is of the total sum of all the numbers in the set.

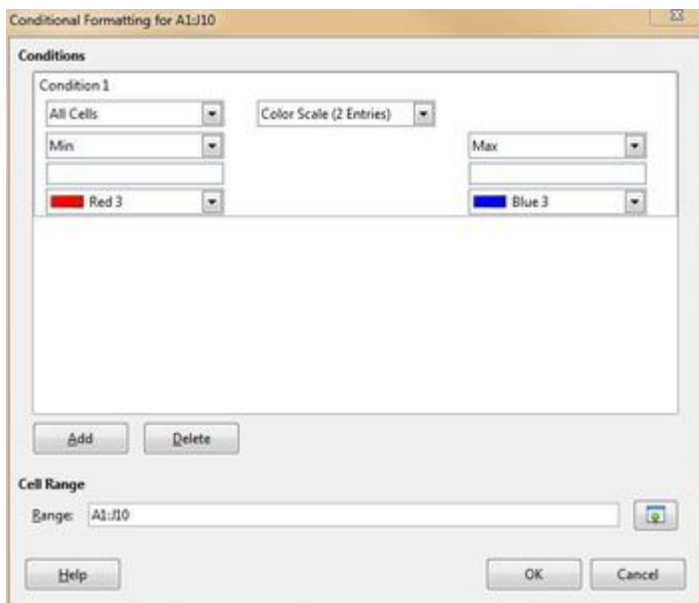
Color Scale

Color Scale is a conditional format that highlights values in a gradient of chosen colors depending on their value. This method gives you a quick visual clue about where a value lies within the overall range. You can use 2 or 3 colors to create your scale. I will demonstrate both.



We will set up a range of values to demonstrate how the scale works. The range we are creating is linear so you can see the way the colors graduate from one to the other. Start by entering the value 1 in the cell A1. Select cell range A1:A10. Edit > Fill > Series. In the dialog, select Down for the direction, Linear for the Series Type, and 10

for the Increment value. Click OK. The values will fill in. Now, select cell range A1:J10. Edit > Fill > Series. Select Right for the direction, Linear for the Series Type, and 1 for the Increment value. Click OK. If you did everything correctly, you will have the values from 1 to 100 in 10 rows.



Now, let's set up our Color Scale. If not still selected, select cell range A1:J10. Format > Conditional Formatting > Color Scale. Color Scale is always set at All Cells. Set the top center dropdown box to Color Scale (2 Entries). Leave the rest of the settings at their default values. Click OK. Notice the range of numbers are highlighted by a gradient of colors starting with the default red and blending more with the blue until it gets to the center, then the red starts to fade out as it graduates back to blue at the end. So, you can see here how the scale works. If your number is highlighted in a purplish color, you know that it is a mid-range value. The more red, the closer to the beginning; the more blue, the closer to the end.

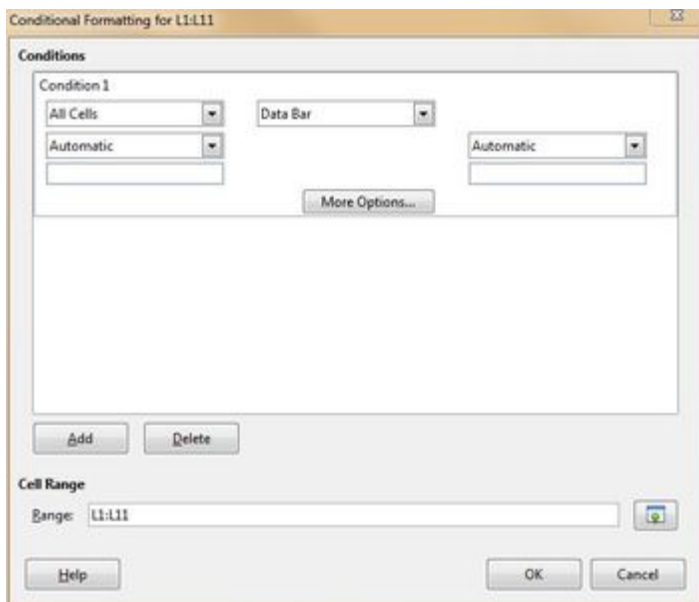
We can add a third color to the scale, increasing the visual effect. Format > Conditional Formatting > Manage. Select the condition in the list and click Edit. Switch the top center dropdown to Color Scale (3 Entries). The three center entries relate to the third color. Select Percentile for the type, 50 for the value, and Green 3 for the color. Click OK. Click OK again to close the Manage Conditional Formatting dialog. You now have two color gradients. Red to green, green to blue. The more green, the closer to the middle. It might help to format the cells font color to white so they stand out against the colors better.

	A	B	C	D	E	F	G	H	I	J
1	1	2	3	4	5	6	7	8	9	10
2	11	12	13	14	15	16	17	18	19	20
3	21	22	23	24	25	26	27	28	29	30
4	31	32	33	34	35	36	37	38	39	40
5	41	42	43	44	45	46	47	48	49	50
6	51	52	53	54	55	56	57	58	59	60
7	61	62	63	64	65	66	67	68	69	70
8	71	72	73	74	75	76	77	78	79	80
9	81	82	83	84	85	86	87	88	89	90
10	91	92	93	94	95	96	97	98	99	100

Data Bars

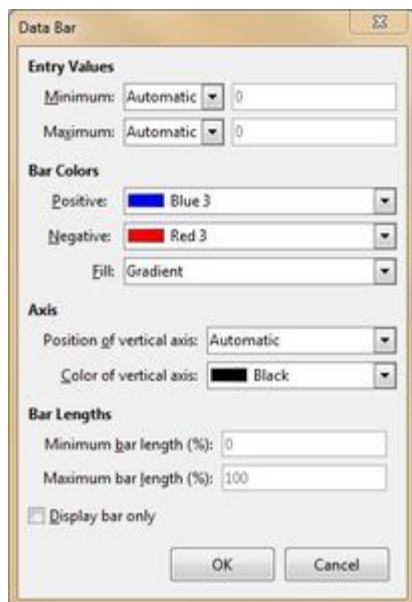
Data Bars are like a quick-and-dirty bar chart right in your spreadsheet, creating a data mixed with chart effect. To make data bars look good, it helps to make the columns a little wider. We will place our data bars data at the end of our previous table so you can do just that.

To set up our data for the data bars, select the cell range L1:L11. Edit > Fill > Series. In the Fill dialog, select down for the Direction, Linear for the Fill Type, -50 for the start value, and 10 for the Increment. Click OK. The data will fill in from -50 to 50 in increments of 10.



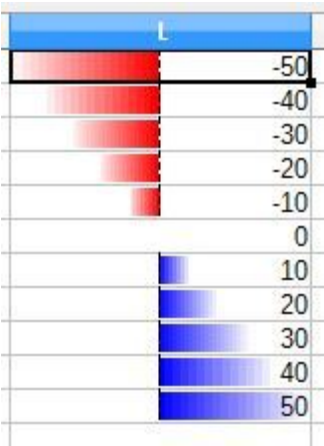
To create the data bars, select the cell range L1:L10. Format > Conditional Formatting > Data Bars. Just like the color scale, the setting must remain on all cells. You can use any of the calculation methods to create your upper and lower range, but leaving it on automatic shows the best results for our data. Click OK. You will see that the cells are split in half. The negative numbers grow to the left in red, and the positive numbers grow to the right in blue. Notice the gradient scale on both colors.

But that's not the end of this story. Did you notice the More Options button? Maybe you even clicked on it. You're the type who likes to get ahead, aren't you? Well, let's go back and take a look at those options. Let's edit our data bar range, Format > Conditional Formatting > Manage. Select the Data Bars range (L1:L11) and click the Edit button. Finally, click on the More Options button.



Here you can adjust the minimum and the maximum just like in the dialog. The Bar Colors options allow you change the colors for positive and negative numbers. The Fill lets you change from Gradient to Color (solid). Position of the Vertical Axis changes the position of the center or zero line. Automatic will adjust its position depending on the type of numbers you have. For positive numbers, it automatically left-justifies the bars, but for negative numbers, it automatically right-justifies the bars. For a mix of positive and negative numbers, Automatic centers the 0-axis line; Middle forces the vertical axis to the center of the cells; None forces the bar to left-justify, even the negative numbers. With None, the only way to know positive from negative is by the color. Using Middle or None for the vertical axis activates the Bar Lengths. Here you can adjust the minimum and maximum lengths as a percentage. If you want all values (except zero) to show a bar, you can set the minimum to 1. Or, if you don't want the bars to go all the way to the left or right, you can set the maximum to something other than 100 (say 80). Play around with these options to see what kind

of results you get. The Display Bar Only check-box causes the cells to just show the data bars and hides the number values.



Icon Sets

Icon sets are used to show whether a value is below, equal to, or above a defined value. The icon sets come in several varieties, and in sets of 3, 4, or 5 icons. Use them according to the style and number of icons you need. We will set up a group of random numbers, average them, and then use three arrow icons to determine whether the values are above or below the average.

Random Number Generator

Data
 Cell range: 

Random Number Generator
 Distribution:
 Minimum:
 Maximum:

Options
☐ Enable custom seed
 Seed:
☐ Enable rounding
 Decimal places:

For the setup, select cell range A13:A24. Edit > Fill > Random Number. Set Distribution to Uniform Integer, Minimum to 50, and Maximum to 50,000. Click OK. In cell C13, enter the formula =AVERAGE(A13:A24).

Conditional Formatting for A13:A24

Conditions

Condition 1



Cell Range
 Range: 

To set up our icons, select cell range A13:A24. Format > Conditional Formatting > Icon Set. Change both of the dropdown boxes to the Formula method. In the first text-box with the yellow right-pointing arrow, enter the formula as =C13. If the value of the cell equals the value in C13, the yellow arrow will show in the cell. If the value of the cell is less than the value of C13, the red down-arrow will display in the cell. In the second text-box, enter the formula =CEILING(C13, 1, 0). The CEILING function takes the number provided, in this case the value in cell C13, and rounds it up according to the value in the second argument. Since we have 1 as the second argument, the function will round the number up to the next whole number. The third value, set at 0 in our case, controls whether negative numbers are rounded according to their actual value or absolute value. In order to round based on the absolute value, you would set the third argument to something other than 0 (zero). Click on the OK button, and the arrows will show in the cells based on their relationship to the value in C13.

12			
13		1186	11697.33333
14		15116	
15		5297	
16		10314	
17		4631	
18		8573	
19		16983	
20		14458	
21		14500	
22		5903	
23		3113	
24		40294	

Conditional Formatting gives us the ability to give visual clues about the values in a spreadsheet without having to create a chart or graph. Color Scale sets the background color on a cell – based on its value within a

defined range. Data Bars creates a mini bar-chart directly in the cells. Icon Set marks the cells with icons based on their conditional relationship to some value. Each method has its own function, giving you a different style of results. Just like when creating a chart or graph, you have to make the decision about which one works best for your application.

Bibliographies in LaTeX:

“We get by with a little help from our friends”

John Eddie Kerr

For this edition of the LaTeX segment, I will tell you a little bit about BibTeX and how it can help you. To help liven up a dry subject, I'll compose an ultra-short paper, and I'll include information about that great album by the Beatles: “Sgt. Pepper” – that you probably did not know about! But first... you need to know about a bibliographic software called Zotero.

Zotero is a plug-in for Firefox. To describe it well, I will post a quote here from the Zotero website:

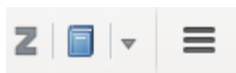
“Zotero is the only research tool that automatically senses content in your web browser, allowing you to add it to your personal library with a single click. Whether you're searching for a pre-print on arXiv.org, a journal article from JSTOR, a news story from the New York Times, or a book from your university library catalog, Zotero has you covered with support for thousands of sites.”

And, just like LaTeX, there are thousands of YouTube videos on how to use Zotero. There are also very good videos on how to create citations and bibliographies.

What does Zotero do for you? Suppose you are conducting research for a term paper. You are searching online for journal articles. When you find one that is on point for your paper, you can click a tiny icon on your browser and all of the bibliographic information that you need is downloaded to your own database. You also have the URL for the article, and a copy of the article is

downloaded to your computer. Zotero can download bibliographic data for any book you find in a library catalogue. Almost anything that you find on the Internet can be catalogued by Zotero, all with a click of a mouse.

It is these little icons that do all the magic for you:



Z opens the Zotero database; the blue book icon downloads the bibliographic information – note that different icons appear for various types of media.

So where is the connection to LaTeX? And BibTeX?

Zotero will export your data in many forms, one of them is the BibTeX format and it looks like this:

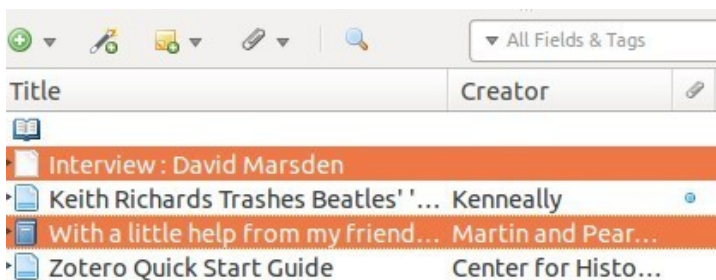
```
@Book{ID,  
  ALTAuthor = {author},  
  ALTeditor = {editor},  
  title = {title},  
  publisher = {publisher},  
  year = {year},  
  OPTkey = {key},  
  OPTvolume = {volume},  
  OPTnumber = {number},  
  OPTseries = {series},  
  OPTaddress = {address},  
  OPTedition = {edition},  
  OPTmonth = {month},  
  OPTnote = {note},  
  OPTannote = {annote},  
}
```

Many LaTeX editors will create the appropriate template for the item you wish to record. Quite simple to use, inside the { } we just type in the information required. The most important field is the field on the first line. “ID” must be a unique identifier or “key”. So, for a book I would have written, the key could be “jek2015”.

It would be tedious to type in all of that information, but at least this way you have to type it only once. But Zotero can do all of that for you, here is a citation that I harvested from the catalogue at my local library with a click on the blue icon in my browser:

```
@book{martin_little_1994,  
  address = {Boston},  
  edition = {1st U.S. ed},  
  title = {With a little help from my friends: the making of {Sgt}. {Pepe}},  
  isbn = {978-0-316-54783-3},  
  shorttitle = {With a little help from my friends},  
  publisher = {Little, Brown},  
  author = {Martin, George and Pearson, William},  
  year = {1994},  
  keywords = {1961-1970, Beatles, England, Rock music},  
  annote = {Includes index}  
}
```

All that typing was done for you with a click of a mouse way back when you were searching the library online catalogue. To export the record, highlight the record (multiple records can be done by holding down the ctrl-key while you click on other records required for the bibliography).



Right click and choose Export Items, scroll in the next window to BibTeX, then click OK.

Sometimes we may want to tweak the records. I would change:

```
martin_little _1994
to
gmartin94.
```

```
@book{gmartin94,
  address = {Boston},
  edition = {1st U.S. ed},
```

Unfortunately, we can edit the record key only in the BibTeX file, not the Zotero file. So if you have a BibTeX file that you have modified, and then you want to add another record, you will have to export that record to its own file and then copy and paste the data into the main BibTeX file.

Now, sometimes we have to manually enter records, I find that for recording websites, Zotero does a great job but the BibTeX output can enter many excess '{ }' that have to be edited out. Just a warning.

Here is a record that I created, to record a conversation I had with one of the pioneers of FM rock, David Marsden of the Internet radio station <https://www.nythespirit.com>:

```
@misc{_interview_????,
  title = {Interview : {David} {Marsden}},
  url = {https://www.nythespirit.com/},
  publisher = {unpublished},
  annote = {When I heard Sargent Pepper I knew that rock music had to mo
}
}
```

The annote field is a good place to enter any text that you want to quote in your paper.

So how do we get this all to work?

The bibliography file must end with the letters bib (Zotero does that for you), and must also be in the same directory as the file that your document is in. (Creating a directory for your LaTeX document is the first rule of LaTeX).

The bibliographic file in this project is called Pepper.bib.

In the preamble add this line:

```
\bibliographystyle{plain}
```

To your document at the end, just before `/end{document}`, add this line:

```
\bibliography{the name of your file.bib}
```

or in this case:

```
\bibliography{Pepper.bib}.
```

The name of the file is case sensitive so make sure that you type the name of the file exactly.

There are many bibliography styles to choose from but I will just use the plain style in my ultra-short paper. Here are some sites that cover the bibliography style in more detail, with examples:

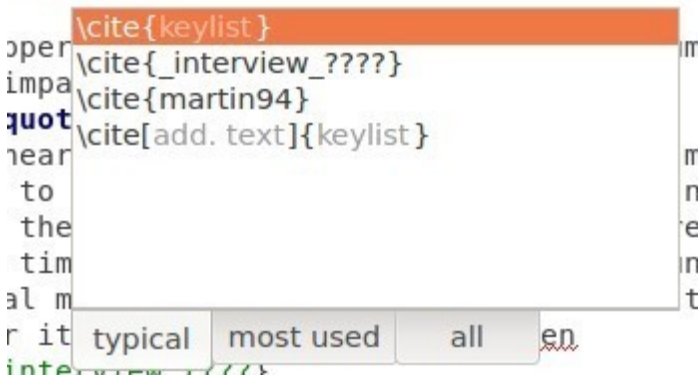
<http://www.cs.stir.ac.uk/~kjt/software/latex/showbst.html>

<http://www.reed.edu/cis/help/LaTeX/bibtexstyles.html#seven>

Many colleges and universities have information regarding bibliographic styles, and also LaTeX templates for a thesis, on their websites; enquire at the institution you are attending.

Whenever you want to cite a source in your paper, type `\cite` and your LaTeX editor should list the citations in your BibTeX file for you to insert:

George Martin reveals his identity for the
w. \cite|



The bibliography is created when you compile your document and it will look something like this:

Many Canadians know that Sgt. Pepper is a real person and George Martin reveals his identity for those who do not know. [2]

Sgt. Pepper was more than just an iconic album, it had a huge impact on radio broadcasting:

When I heard Sgt. Pepper I knew that rock music had to move to the FM band because AM just could not deliver the sound that the rock musicians were making. At that time, the FM band was the sacred ground of classical music. It was a tough fight and it took a year for it to happen. – David Marsden [1]

References

[1] Interview : David Marsden.

[2] George Martin and William Pearson. *With a little help from my friends: the making of Sgt. Pepper*. Little, Brown, Boston, 1st u.s. ed edition, 1994.

Sometimes you may have to compile your document more than once to get the bibliography to compile, that can be normal.

This article has just scraped the surface of the bibliography component of LaTeX. There are other ways of approaching this, and there are many other options in the BibTeX bag of tricks. There is a new format called BibLaTeX, and Zotero will export bibliographies in this format as well. However I must say that – thanks to the

BibTex export feature that we have in Zotero, and that Zotero makes data harvesting from databases so easy – I am in favour of the BibTex file method which is creating a .bib file of your references that resides in the directory of the document you are creating.

I wish I had LaTeX and BibTeX way back in the days when I was writing my papers at University, back in the days when FM stereo was about as high tech as it got. Today, with a little help from your friends (all those people who have created the free software), writing a class paper is so much easier. I am green with envy.

A shameless plug is in order. If you would like to hear what FM Rock radio was like in the early years when the DJ's could practise Free Form FM radio (that was before the suits discovered there was more advertising revenue to extract), I encourage you to explore David Marsden's own show on Saturday and Sunday nights 8:00 pm Eastern time at this site: <https://www.nythespirit.com/>. Code “BEMX” will give you a one-month free trial.

By now I suppose the suspense is killing you, and you have to know the identity of the real Sgt. Pepper. He was a policeman who was on the security team when the Beatles visited Toronto. That morsel of information is on the last page of Sir George Martin's book which is full of interesting tidbits. It is a must read, I enjoyed it. Until next time, enjoy LaTeX.

Programming Advent Calendars

What are they? Where to find them and why should I care?

by Attila-Mihály Balázs

Programming is an activity where you need to continuously learn to stay productive. Programming languages, libraries, tools, operating systems - they all change. This means that last year's solutions that you find on the Internet might not be applicable this year. Thus we need new content (be it blog posts, documentation, books or other forms) showing the current best way to achieve a given goal. One solution is [StackOverflow](#) with its voting system (where out-of-date solutions get voted down and working solutions get voted up) and others are blogs. The problem with blogs is that people rarely have time to blog frequently and/or don't have expertise and a diverse set of domains, thus readership interest can waver. There are tries to encourage people to blog regularly (such as the Perl Iron Man Blogging Challenge), however, it is easier to sustain a blog with multiple authors (also called collaborative blogging).

A programming Advent calendar is such a collaborative blog centering around one language / framework / library or subsection of the IT field. Just as you open one door of an Advent calendar every day between the 1st and 24th of December to find a surprise, these blogs publish one article each day for the first 24 days of December about their respective topics surprising, informing and delighting their readers.

Some of the programming Advent calendars are:

- Java Advent Calendar - <http://www.javaadvent.com/>
I'm partial to this, having started it 4 years ago :-). It contains articles about all kinds of technologies related to the Java Virtual Machine, not just Java the language. For example, we had articles about two of the oldest languages running on the JVM (besides Java): NetRexx and Kawa.
- The Perl 6 Advent Calendar - <https://perl6advent.wordpress.com/>
Perl 6 is a new programming language to be released this Christmas, so if you're interested in Perl 5, this is a good site to follow
- Perladvent - <http://www.perladvent.org/>
If you're not ready to make the jump to Perl 6 yet (since it's a completely new language, not just a superset of Perl 5), here you can find all kind of interesting details about it.
- 24ways - <https://24ways.org/>
"24 ways is the Advent calendar for web geeks. For twenty-four days each December we publish a daily dose of web design and development goodness to bring you all a little Christmas cheer."
- Sysadvent - <https://sysadvent.blogspot.com>
Interesting articles for system administrators and anyone curious about the field of IT.
- UXMas - <http://uxmas.com/>
"An Advent calendar for UX folk."
- Perl Dancer Advent Calendar - <http://advent.perldancer.org>
"The PerlDancer Advent Calendar is a community-driven project that aims to showcase the Dancer Perl web framework."
- 24 Pull Requests - <http://24pullrequests.com/>
This isn't a collaborative blog, but rather an effort to encourage people to contribute to free / open-source software on GitHub
- Qiita Advent calendars - <http://qiita.com/advent->

calendar

There are a lot of topics covered here (and I mean a lot - in 2014 they had 214 different Advent calendars with different topics). Unfortunately, you need to be able to read Japanese to enjoy it.

These are the ones which are currently active (there were others which unfortunately are no longer available).

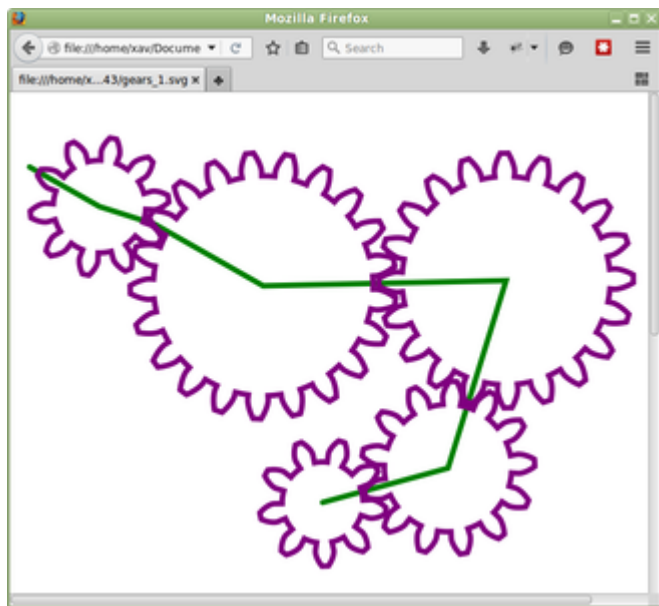
You can subscribe to any of these using your favorite RSS reader (for example Liferea, RSSOwl, feedly, NewsBlur and so on) to ensure that you never miss a post. Some of them (like JavaAdvent) also offer other means of subscription (like Twitter, Facebook, Google+ or even email).

Finally, all of these sites welcome (and in fact depend on) user contribution. So go ahead and subscribe to them and also consider writing an article or two yourself! As they say: the best way to understand something is to try to explain it to others!

Drawing with Inkscape – Part 43

By Mark Crutch

Before we delve too much further into Live Path Effects, there are some implementation details that are worth pointing out. The first is that LPEs don't exist in the SVG specification. They're an Inkscape-specific thing, and no browser or other SVG editor knows how to render them. Go on, give it a try. Create a nice chain of gears, or a Spiro path, then save your SVG file. Open it in a modern web browser and see what you get. Here's my file, opened in Firefox.



Well, it certainly looks like my original Inkscape file, but how can that be if the browser doesn't know anything about LPEs? The answer can be found by looking at the XML code for the file, either via Inkscape's XML editor

(Edit > XML Editor, or CTRL-SHIFT-X), by viewing the page source in your browser (CTRL-U in Firefox), or simply by opening your SVG file in a text editor. You'll see that the main body of the image is made up of an SVG `<path>` element. The “d” attribute contains a series of letters and coordinates that tells an SVG-aware application how to draw the final path, after any visible LPEs have been applied. It's like a snapshot of the result, in a format that your browser understands.

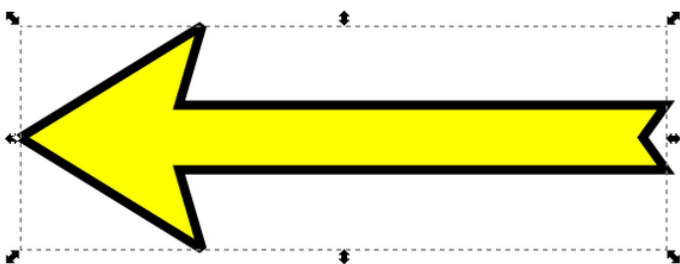
Notice that there are some other attributes, in the “inkscape” namespace. In particular you'll find “inkscape:original-d”, which holds the path definition of the original, skeleton path. There's also an “inkscape:path-effect” attribute, which holds a semicolon-separated list of XML IDs. These refer to `<inkscape:path-effect>` elements up in the `<defs>` section of the XML, which is where all the parameters for your effects are stored.

So, in summary, Inkscape uses the “original-d” attribute and `<path-effect>` elements to hold all the information it needs to draw the LPE. Other applications use the “d” attribute to render a snapshot of the final path, with the LPE applied. When you modify an LPE within Inkscape, it automatically updates the “d” attribute to match the rendered output, so other applications should always be able to display your drawing as intended, even though they don't know anything about LPEs.

Inkscape doesn't always do a great job of clearing out unused elements in the `<defs>` section of a file, and path effect definitions are no exception. If you add and remove a number of LPEs whilst experimenting with your drawing, old definitions tend to build up there. They don't do any harm, but do slightly increase the size of the file. You can clear them out, together with other unused definitions, by using the File > Clean Up Document menu entry (File > Vacuum Defs on 0.48).

Because Inkscape calculates the final path from the original path and LPE parameters, using live path effects places more of a burden on the processor, resulting in slower rendering speeds. Usually this isn't an issue, but when zooming into a very complex drawing it can become noticeable. If you're happy with the LPE output, and don't need to change it any further, you can “fix” the path so that it looks the same, but is no longer based on path effects. Essentially this process just removes the Inkscape-namespaced attributes from the path element, leaving it with just the same “d” attribute that any other application uses. To do this, simply use the Path > Object to Path menu entry (CTRL-SHIFT-C). It may seem odd to use Object to Path on something that's already a path, but think of it as converting an LPE path to a plain SVG path, and it makes more sense. Like any other Object to Path conversion this is a strictly one-way affair, so make sure you keep a backup of the file from just before the change, in case you subsequently find you need to modify your LPE parameters after all.

That's enough behind-the-scenes detail for now, let's press on with another path effect! As usual we'll need a path to work on, so let's start by drawing a simple arrow shape.



The path effect we'll look at this time is “Bend”, so add that to your path following the instructions from the previous instalment. As before, there's no immediate change to your image, but the LPE dialog has gained a

few controls at the bottom. Of particular note is this quartet of buttons:

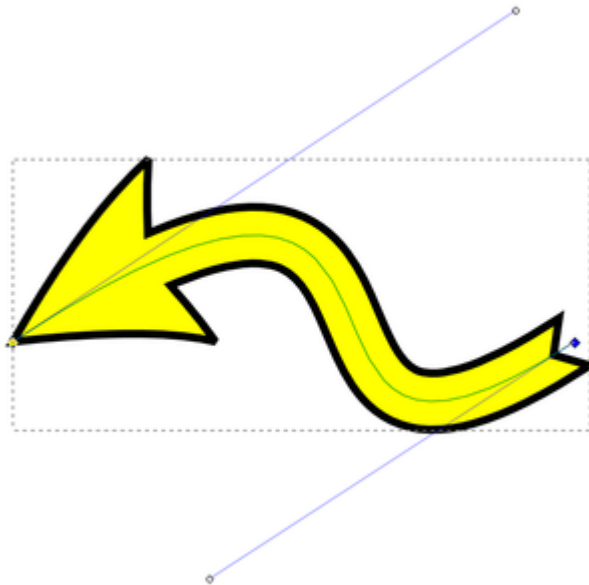


This arrangement of buttons appears frequently in LPEs, whenever an extra path is required as part of the input parameters. In the case of the Bend effect, two paths are required: the original skeleton path (the arrow shape, in this case), and a bend path whose shape dictates how the skeleton path should be distorted. These buttons are for managing the bend path, as follows:

- The first button allows you to edit the bend path directly on the canvas. This is the most commonly used of the four.
- The second button lets you copy the bend path to the clipboard. From there you can paste it into another LPE, or even paste it directly into the canvas as a new path in its own right. These copies maintain no connection to the original bend path.
- The third button is for pasting a path to use as the bend path. This could be one that you've copied from another LPE using button two, or it could be a path you've constructed elsewhere in your canvas. Again, there's no connection maintained to the original path.
- The final button lets you link to an existing path, rather than create a new bend path. In this case there is a live connection to the original path, so any changes you make to that are immediately reflected in the LPE. I'll discuss this button in more detail a little later.

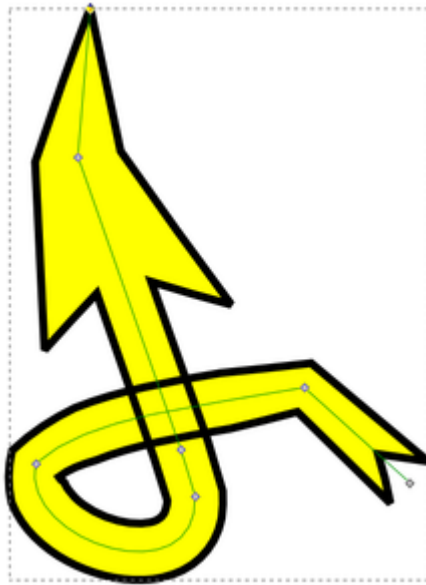
If you press the first button you should find that a straight green path appears on the canvas, directly over your skeleton path. This is the bend path, and you can

manipulate it in the same way as any other. Try dragging the path itself, or use the node handles, to distort its shape, noticing how the skeleton path is morphed in real-time to match your changes. You can also move the nodes themselves, in order to stretch, compress or rotate the skeleton path. If the bend path disappears – usually due to a mis-click causing the skeleton path to become selected – just click on the first button of the quartet in the LPE dialog to make it reappear. With barely any effort the Bend path effect can turn your straight arrow into a curved or sinuous shape that would take a lot more time and work to produce using normal path editing techniques:



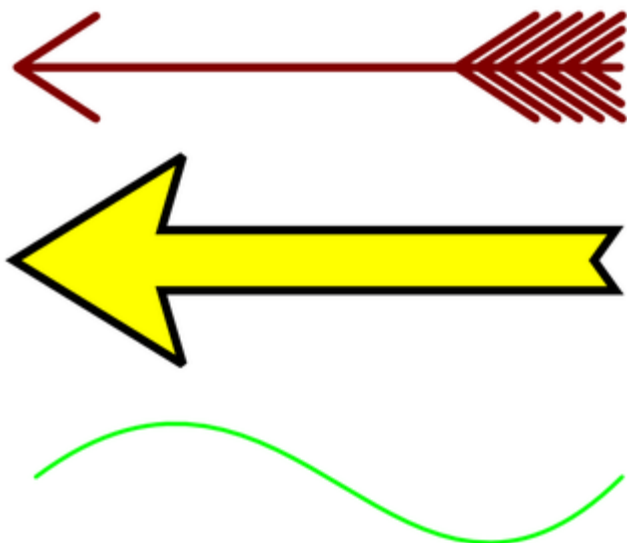
But there's more! Your bend path doesn't have to be limited to a pair of end nodes connected by a curve. You can add extra nodes, turn them into corners, mix straight and curved sections, have the path double-back on itself, or even split it into several sub-paths. Admittedly, getting too complex with your bend path can lead to a degree of contortion that's hard to control, but the options are there

for you to explore.

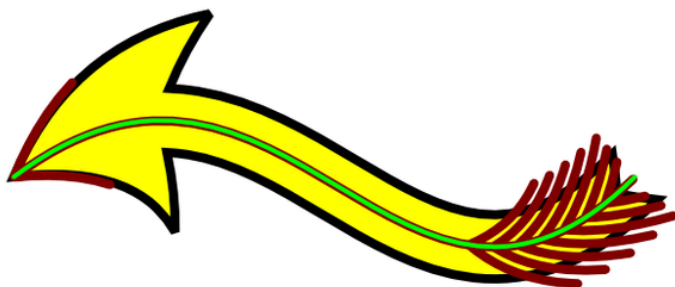


Using the second and third buttons you can copy and paste the bend path from one LPE to another, which can be handy if you want several skeleton paths all distorted in the same way. Each bend path will be an independent copy, though, so changes to one won't affect the others. Sometimes it's useful to have multiple bend paths all linked to a single “master” path, such that changes to the shape of the master are immediately reflected in each individual LPE. The fourth button allows you to achieve that effect, but it's not without its difficulties.

For this example I'm going to use two different kinds of arrow, and I want to apply the Bend LPE to both of them such that they follow the shape of the green path at the bottom of the image.



The first step is to select the green path and copy it to the clipboard. As well as copying the path data itself, Inkscape also stores a reference to the original object. Next I need to select one of the arrows, add the Bend LPE, and click on the fourth button to use the stored reference to define the bend path. Clicking this button has two immediate effects: the arrow is distorted to match the bend path, as expected, and the arrow is moved to the same location as the bend path – which is not what I wanted! If I add a Bend LPE to the second arrow and link that to the bend path, that also gets moved. I've got all the right shapes, but not necessarily in the right locations.

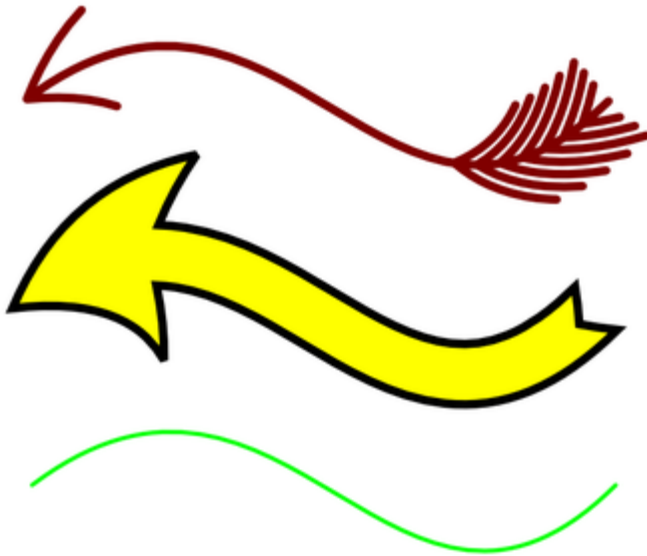


At first this might seem like a fairly trivial problem. Just drag the arrows back to where you want them, right? Unfortunately that doesn't work – drag them away and they'll spring right back to the location of the bend path. Drag the bend path away, and they both follow along after it. Being able to link to a common path seems a lot less useful if it means that your linked shapes all have to sit on top of each other.

Fortunately there are a couple of ways around this problem. Inkscape has a setting hidden away in Edit > Preferences > Behaviour > Transforms labelled as “Store Transformation”, with options of Optimised or Preserved (it's in File > Inkscape Preferences > Transforms on 0.48). Use Optimised and you'll see the behaviour I've described above – LPE paths strongly bound to their linked bend path. Set it to Preserved, however, and you can move them around with impunity. Of course there's a trade-off: Optimised results in slightly smaller, more efficient files, whereas Preserved potentially stores additional data for any object that's been transformed, not just the ones that are causing us problems.

If you want to leave the setting as Optimised, there is a second alternative which allows you to add extra data to just the problem paths. It's a little counter-intuitive, but it does the job perfectly: just select your path and add a second Bend effect to it. You don't even have to modify

the bend path – just adding the effect is enough to let you drag your path around independently of the linked bend path once more.



Whichever approach you take, you should now have two separate, independently positioned arrows, both of which are linked to the shape of the master bend path. Modify that path and you'll see the arrows shape change accordingly. If you don't want to see the bend path in your final design, simply hide it behind another object, set its opacity to 0 (use View > Display Mode > Outline to find it again) or just move it onto a hidden layer.

The remaining controls for the Bend LPE are fairly simple. The Width spinbox lets you control the scaling of the skeleton path, perpendicular to the bend path. Play with it to see the effect. The “Width in units of length” checkbox has a slightly misleading title: “keep width proportional to length” would be a better name. Check this, and the width of the path is scaled as the length of the bend path changes; leave it unchecked to keep the

width unchanged regardless of the shape of the bend path or the position of the end nodes. The final checkbox is quite self-explanatory: if you wish to bend a path that's more vertical than horizontal (e.g. an upwards facing arrow), then check this box, otherwise you'll be distorting along the width of the shape, rather than its length.

The Bend LPE is one that's well suited for use with text, to produce the sort of “Word Art” effects so beloved of parish newsletters in the 1990s. Because LPEs won't work directly on a text object, you first have to perform the one-way conversion of your text into a complex path. Using Path > Object to Path will result in a group of individual paths, one for each letter. We really want a single path encompassing the whole text, so it's easier to use Path > Combine, which will convert your text into paths, and combine them into a single complex shape, all as one operation. The final result will be a group of one object, so you'll probably want to ungroup as well. From there you're free to add a Bend effect and distort your text as you would with any other path.

Before you race off to convert your text into a path, however, it's worth considering the downside: the shape is no longer a text object, so you can't subsequently edit the content if you find a mistake. Often a similar result can be obtained by drawing a separate bend path, then selecting both your text and path before using Text > Put on Path. You may need to manually kern some of the characters to get the right result (see part 11), but it has the distinct advantage of keeping your text editable. In this image the red text was converted to a path and bent, the green is the same text put onto a copy of the bend path, and the blue is the same as the green, but with some manual kerning applied.

Warped Text
Warped Text
Warped Text

One noticeable difference between the approaches is that the LPE distorts the shape of the letters, whereas text-on-a-path maintains their original shapes. Sometimes the distortion effect is desirable, in which case I can only recommend that you save a copy of the file just prior to converting to a path, in case you do need to edit it later.

Next time we'll move beyond simple path bending and into the kind of full-on distortions that can turn some simple text into a 1970s album title, as we continue to look at Inkscape's live path effects.

Mark uses Inkscape to create three webcomics, 'The Greys', 'Monsters, Inked' and 'Elvie', which can all be found at <http://www.peppertop.com/>

Arduino

by Ronnie Tucker

The first week in November brought an update to the Arduino IDE. The upgrade to 1.6.6 brings in an impressive 720+ bug fixes.

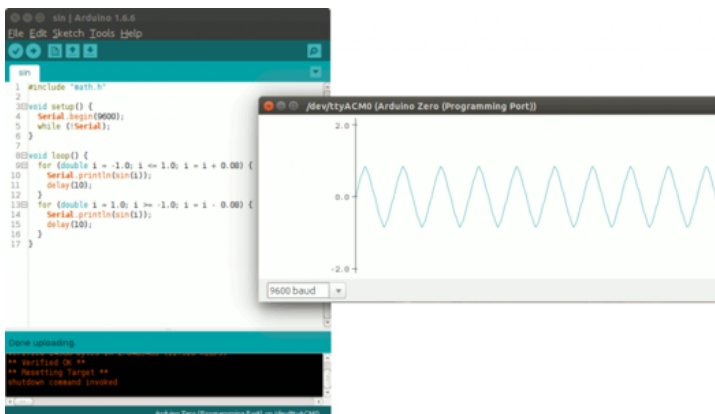
Best New Feature

There are several new features (that I'll probably never use) such as a command-line tool, a new modular architecture, lots of bug fixes, etc, etc, but for me it's all about:

Serial Plotter - Now we're talking! This I can use. By using a command like:

```
Serial.println(analogRead(A0))
```

you can view real-time data in a nicer way than just having numbers flying past.



Having data output to the serial monitor is really handy, but being able to see it in a more visual way is a

great new addition!

Uh oh!

Having said nice things about it, there are also many comments floating around the Internet saying that 1.6.6 has some seriously bad, and some say critical, bugs.

So, if you REALLY want to update: go for it, but be aware that it's currently not without its risks.

In other Arduino news: I just bought a RepRap Fisher Delta 3D printer kit which is Arduino powered. So, in the next month or two, expect the Arduino section to cover 3D printing. I'm hoping to do some time-lapse video/photography of the build, and probably end up writing a review of it too.

Chrome Cult 8

by SJ Webb

I aimed to provide an encryption how-to using a Chrome browser and the app store. However the recent news by Google caused this impromptu opinion piece. Chrome OS and Android are being merged into a new OS. The beta OS will premiere in 2016 and the full hybrid of mobile and cloud OS will emerge. It will be ready for consumers in 2017. There are no details about the name for this new OS or hardware associated with it.

Google has given conflicting reports of maintaining the Chrome OS for the current Chromebook base. In an ideal world the new hybrid OS will run on the Chromebooks without fault. If not, I will be using Crouton for Ubuntu Mate.

People are split on this decision. They believe Google is killing off the Chromebook, despite the continued growth and popularity. Others believe it is a natural evolution of the Google Ecosphere. Google has killed off unpopular items in the past. However the Chrome OS is too popular to completely kill off.

Let's review Google's two OSes independently: Android and Chrome. Android is the leading mobile OS, with a strong app developer presence. However it is plagued by being insecure, and lacks proper and timely security patches. Chrome is extremely secure using native SSD encryption, web app sandboxing, and security updates every 6 weeks. Yet Chrome has a much weaker app store developer presence. Ideally, by merging the security of Chrome OS and the Android App Store together, Google will get scale and efficiency. They will have more users on

the Google Ecosphere by pushing this new hybrid OS.

Google has already started to create an Android Chromebook Prototype. It is called the Pixel C. It offers the tablet features, but with an optional keyboard. I believe this will be the first computer that will sport the hybrid OS.

The Pixel C is priced around \$500. However it will come with 3GB RAM, Nvidia Quadcore processor, Maxwell GPU and a 32GB or 64 GB SSD. The Pixel is still Wi-Fi dependent. This device is following the trend of tablets sales, since desktop computers are declining. This device will still make Google relevant as consumer trends change.

After using my Chromebook for the last few months, I would recommend it as a backup computer to a Linux distro or MacBook. I would recommend my Chromebook as the main computer over any Microsoft OS. I do not mind living in the cloud as long as limitations are known. I suspect a Chromebook-like device will be my kid's first laptop. I learn to adapt to my Chromebook. Undoubtedly I will learn to adapt to this new OS coming out in 2017. For the time being, Chrome Cult will continue to review the cloud computing experience.



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Write For Full Circle Magazine

Guidelines

The single rule for an article is that it must somehow be linked to Ubuntu or one of its many derivatives—Kubuntu, Xubuntu, Lubuntu, etc.

Write your article in whichever software you choose—I would recommend LibreOffice. But, **please spell and grammar-check it!**

The Official Full Circle Style Guide can be read at: <http://url.fullcirclemagazine.org/75d471>

Please read this document before submitting an article. Follow the guidelines and you will have a much better chance of seeing your article in Full Circle.

Writing

There is no word limit for articles, but be advised that long articles may be split across several issues. In your article, please indicate where you would like a particular image to be. Please do not use any formatting in your document.

Images

Images should be no wider than 800 pixels, in JPG format, and use low compression.

When you are ready to submit your article, please email it to: articles@fullcirclemagazine.org

Non-English Writers

If your native language is not English, don't worry. Write your article, and one of the proofreaders will read it for you and correct any grammatical or spelling errors. Not only are you helping the magazine and the community, but we'll help you with your English!

FOR REVIEWS:

Games/Applications

When reviewing games/applications, please state clearly:

- title of the game
- who makes the game
- is it free, or a paid download?
- where to get it from (give download/homepage URL)
- is it Linux native, or did you use Wine?
- your marks out of five
- a summary – with positive and negative points

Hardware

When reviewing hardware, please state clearly:

- make and model of the hardware
- what category would you put this hardware into?
- any glitches that you had while using the hardware?
- easy to get the hardware working in Linux?
- did you have to use Windows drivers?
- marks out of five
- a summary – with positive and negative points

You don't need to be an expert to write an article – write about the games, applications and hardware that you use every day.

Linux Labs - Building a 3D Printer

By Charles McColm

Rick Jenkins is a volunteer with The Working Centre's Computer Recycling Project. Besides being a good computer technician he's also a very skilled artist, 3D modeller and all around tinkerer.



Rick's passion for tinkering has in the past led him to create a number of cosplay props ranging from a full length steampunk jacket to a steampunk gun that featured a light-by-light power-up effect and full sound effects. He's also a long time open source user who started out with an early release of Red Hat Linux. Currently Rick uses Arch Linux on his home system, but he chose to install Ubuntu on the computer for his latest project: the Vaster Mini3 3D printer outlined on Instructables.com:

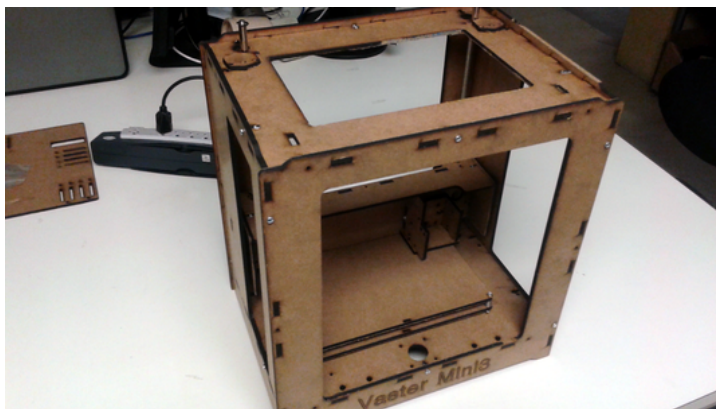
<http://www.instructables.com/id/Building-a-3D-Printer-Under-299/>

Ubuntu made sense for the computer running the 3D

printer because there were already packages for the makerbot software. Rick uses Slic3r, which does the same as the makerbot software, and Blender to build the models.

3D printers have been available for a few years now and Rick predicts that within 5 years there'll be models cheap enough that most people will have at least one 3D printer in their home. Part of the impetus for building (over buying) the 3D printer came from the availability of local resources. In Kitchener, Ontario, the local maker group, Kwartzlab, has a large laser cutter and several 3D printers. The local library also has a 3D printer. The other itch to build (over buy) came from Rick's tinkerer nature.

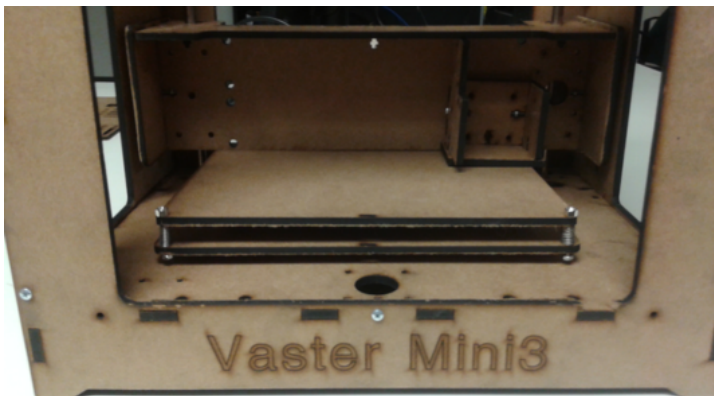
The design for the printer came from instructables.com which has links to some of the sources for the hardware, the motors and the Arduino. The nuts and bolts were bought at Spaenaur and the metal rods and some of the additional components were recovered from old inkjet printers from the Computer Recycling Project.



The greatest challenge building the printer was collecting all the information to build it. The initial research before cutting out the first part with the laser cutter was significant. Knowing why he needed to use

each part was important to ensure proper operation: making sure the stepper motors are moving the right distance, making sure there's no print slide (instead of getting a cube, getting a parallelogram - misalignment).

Rick chose to build the Vaster Mini3 over other instructable designs, partly because of the way it looked and partly because it was described as an under \$300 make your own 3D printer. In fact the costs actually ended up around \$140. The most expensive parts were the Arduino control kit and the Nema 17 motors. Rick extracted several motors from inkjet printers, but because of where the mounting holes were on the design the Nema 17 motors were necessary.



The structure of the 3D printer is mostly complete after 1 ½ months invested. Part of the time investment was due to limited access to the laser cutter, sourcing local shops, and waiting for ordered components to arrive. All that's left now is waiting for the motors to arrive. Once parts are in it should only take a couple of days to do the initial complete assembly, do the initial test prints and recalibration.

With the structure assembled, a good part of the 3D printer is built, but there are still several things that could

go wrong. The Arduino may not take the initial flashing of its BIOS to tell it that it's a 3d printer. The Slic3r software may provide standardized gcode that the Arduino may not interpret correctly. One of the Nema 17 motors may not work right. The extruder assembly could jam and malfunction. The motor feeder may feed at the wrong speed compared to the heater head. The thermistor might misinterpret the temperature. This is why Rick spent so much time on initial research.

On the computer side of things Rick started with an old Pentium 4, but found that Blender choked too much. The Computer Recycling Project had recently had several generous donors so he ended up reclaiming an AMD Quad Core A6-3620 APU system with 8GB RAM, a 1TB hard drive and the onboard Radeon HD6530D graphics. It handles pretty much any Blender design Rick throws at it.

For anyone thinking about building a 3D printer, Rick suggests connecting to a source of information, such as 3d printing groups, so you can talk to other people who have gone through the process of either buying or building a 3d printer. It's the best resource. Online resources are great but they don't always tell the full story. In person you get immediate responses. Online there can be a lot of time wasted trying to get the right answer. Also in person, if you have the machine in hand, someone who has built a machine can look at it and point out anything wrong with it.

Rick plans to print replacement components for computers/laptops as well as special personal projects like a lightsabre, and other costume accessories.

People can contact Rick on Googleplus:
gaelfling@gmail.com

Kwartzlab: <http://www.kwartzlab.ca/>

Vaster Mini3 printer: <http://www.instructables.com/id/Building-a-3D-Printer-Under-299/>

Ewaste \$60 printer: <http://www.instructables.com/id/eWaste-60-3DPrinter/step2/Step-2-Preparing-Motors/>

Slic3r: <http://slic3r.org/>

Blender: <http://www.blender.org/>

*Charles McColm is the author of Instant XBMC, a short book on installing and configuring XBMCbuntu (a *buntu + XBMC distribution) - still relevant for Kodi, and the project manager of a not-for-profit computer reuse project. When not building PCs, removing malware, and encouraging people to use GNU/Linux, Charles works on reinventing his blog at <http://www.charlesmccolm.com/>.*

Ubuntu Phones

BQ Aquaris Ubuntu phone released in Russia

After previous successful launches of the Aquaris E4.5 and E5 HD Ubuntu Editions, BQ will now release Ubuntu Phones in Russia. Devices will be available for purchase through a host of local distributors such as Ozon.ru (<http://www.ozon.ru/context/detail/id/34629381/>). The Aquaris E5 HD Ubuntu Edition will be sold at a price of 15,499 with the soon to be launched Aquaris E4.5 at a price of 12,499.

Russia continues to be an important market for Ubuntu with a strong and fervid fan-base and developer community. Demand has also increased in the region since the initial launch of the devices back in February this year.

more: <https://insights.ubuntu.com/2015/11/17/bq-aquaris-ubuntu-edition-phones-land-in-russia/>

OTA-8

This list is only a highlight of the few changes available in this update. Please check the detailed changes for all the changes included in this OTA.

Important features

- New 15.04.2 framework, UTK offering new PageHeader component
- New twitter scope, new book aggregator scope
- Sound controls in the sound indicator (Play, Pause)
- QtPurchasing based in-app-purchases
- Webbrowser:

- Media access permissions for sites
 - Top level bookmarks view
 - Thumbnails and grid view for Top Sites page
- Buteo used for contact sync
 - Location service velocity and heading information
 - OTA version numbering now visible in system-settings (e.g. OTA-8)
 - Completely re-designed weather-app
 - Porting core-applications to UITK 1.3

Bugfixes

As we know, each release includes a huge number of bugs - some for previous issues and some for new regressions introduced in-between. To see the overall list of what issues got fixed, please check the detailed changes below. The interesting ones are as follows:

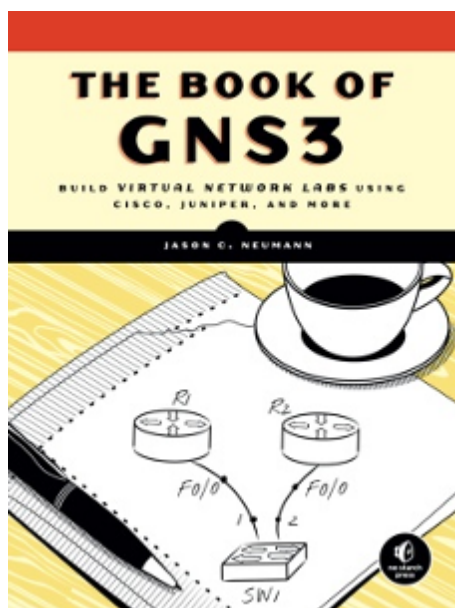
- Performance fixes for various components (e.g. messaging-app, SDK components)
- Fixes to location accuracy
- Reduced power use when there is no network connection
- Call ringtone will play on speakers with headphones connected
- Fixes to reduce some of the UI hangs due to dbus traffic ...and much much more.

Detailed changes

- Commitlog: <http://people.canonical.com/~lzemczak/landing-team/ota/ota-8.commitlog>
- Milestone bug list: <https://launchpad.net/canonical-devices-system-image/+milestone/ww46-2015>

Review: The Book of GNS3 by Jason C. Neumann

By Lucas Westermann



July 2015, 272 pp.

ISBN: 978-1 -59327-554-9

<https://www.nostarch.com/gns3>

Recently, I received a review copy of “The Book of GNS3” by Jason C. Neumann from No Starch Press. After having read through it, and testing out as much of the content as possible, I’m ready to present my review. But before we get to the book itself, let’s answer a question some readers will probably have.

What is GNS3?

GNS3 stands for Graphical Network Simulator-3, and is a tool to simulate networks (including virtualized and physical hardware). It is commonly used for testing networks before deployment, or for certification exams.

About the Book

The book itself goes into detail as to what hardware/software the program can handle, as well as why you may want to use it. It's geared largely towards networking engineers, or students studying networking in some fashion. However, if you're interested in dabbling, or want to study up on GNS3 for work on your own time, this book will probably fulfill that need. While the book offers a decent index, I have a hard time seeing it fulfill the role of a quick-and-easy reference book. So if you don't want to follow along step-by-step, or are looking more for a cookbook-style book, you may want to look for alternatives. However, this is not a point against the book - it doesn't market itself as a cookbook, but as a guide to GNS3. Which it very much is.

Style

Jason C. Neumann manages to write in a way that, while filled with information, is still easy to understand, and often amusing. The book also contains a large number of screenshots, which help the reader to follow the steps accurately. They are often placed in such a way that no paragraph is cut off before/after the image, which helps the flow of text. If you don't feel you need the images, skipping over them should be a simple enough matter, without abrupt line breaks in paragraphs or sentences.

The formatting used for commands and text ensure they are easily read, and all characters can be identified without issue. Additionally, any changes to files, or important segments, are marked in bold. Combined with

the screenshots, the formatting is often enough to head off or solve any issues you may run into. Not only this, but the author sticks to his formatting system in the actual prose of the book as well. This means any buttons, menu items or other important words, are also marked in bold. So if you're skimming through a page trying to find where you went wrong, or where that menu item disappeared to, you'll be able to easily catch it on the page.

Information

The book is OS-agnostic - it covers installing GNS3 in Ubuntu, Windows and Mac OS X, as well as compiling it from source. It covers all operating systems wherever there may be differences, and since large parts of the book focus on virtualized hardware, it doesn't feel like you're skipping paragraph after paragraph if you're using Linux instead of Windows.

The book covers everything from installing and setting up GNS3, to physical and virtualized hardware, and on to some projects "for a rainy day". The author focuses mainly on Cisco and Juniper devices, but as they appear to be the most common choices, it seems like a good decision.

Wrap-Up

While this book is by no means an exhaustive list of everything that is possible with GNS3, it is an excellent introduction, or a supporting book for anyone involved in a certification exam/school course where GNS3 and Cisco/Juniper devices are the focus. If you're looking for a cookbook or dry reference book for quick and easy answers to questions, you will most likely need to keep looking (although I do recommend keeping it on the list, just in case).

If you're trying to expand your horizons on your own (for work or for yourself), this book should be able to guide you through GNS3 and give you enough information to do so. However, you may need to do a bit of googling, or experiment with GNS3 on your own, depending on your current skill level and end goals. I should also note that this is not a Cisco networking certification study guide, simply a book that covers some aspects that may arise in the exam. So if your goal is a certification, you will need to combine this book with the other aspects of your particular exam.

Score: 5/5

While this book isn't an exhaustive resource, and won't suit everyone's needs, it does achieve exactly what it sets out to be: an introductory guide to GNS3.

My Story

Photorec

AuntieE of the French Translation Team

Because Ronnie had reported the successful recovery of over 500 photos with Photorec after the Great Crash of his hard drive in 2014, I offered to try to recuperate pictures on the HD of a friend in the States whose computer expert had said it would be impossible to retrieve anything... and yet it contained pictures that were invaluable to her. She mailed me the drive and, after it had spent the night in the refrigerator (NOT the freezer) I went to work.

Windows 10 on a 4-year-old Toshiba laptop kept offering to format the two partitions (one Windows RE-Store, the other, apparently, system and data, in a roughly 10-90% partition setup of the 500 Go), but would then say partitioning was impossible. The disk utility of Ubuntu 14.04 (on a Samsung Netbook that dates back to 2007) didn't even find the disk. With nothing to lose, I googled testdisk and went to the official download page at http://www.cgsecurity.org/wiki/TestDisk_Download where the latest version is 7.0. I downloaded the testdisk-7.0.linux26.tar.bz2 and copied it to my home folder on the Samsung. I then used the terminal to unzip it with `sudo tar xvf testdisk-7.0.linux26.tar.bz2` which created a folder called testdisk-7.0, inside of which, among other things, was *testdiskstatic* and *photorecstatic*.

OK, I thought I'd start with testdisk and both partitions came up green, although the drive still wasn't recognized by the disk utility. (I admit that I didn't go into the log or try to understand anything...) Instead, I then went directly to photorec (everything is done with the command line) :

cd testdisk-7.0, then sudo ./photorec_static. I got a page asking me which drive I wanted to recuperate things from : I chose the Windows one first, but, after about six hours, I stopped that and started over.

I won't bore you with my umpteen tries that lasted overnight and beyond (until everything got too hot to work), BUT I finally realized that I could use the options.

So: cd testdisk-7.0, sudo ./photorec_static, password, new page, select partition, new page, type of partition selected (in my case FAT, etc.), new page, where do you want to save the recuperated files? It suggests doing it within the testdisk folder, so I hit c (to show that that was correct).

At some point, at the bottom of the page where the first option (Proceed) is automatically selected, there is the possibility to choose Options (arrow key + Enter) and, there, to choose NOT to disable Brute Force (in other words to enable it), Enter. Then you can move to the File Opt where you can deselect everything by hitting b (I think, I'm doing this from memory because the Netbook refuses to search the hard drive any further...). All the X's in the boxes next to file types disappear and you can navigate down the list to choose what you really want, in my case JPG and DOC + Enter. THEN you can return to Proceed (with the left arrow key) and press enter.

With just two file types selected, the search was much faster: 465 hours instead of 1654, or something else unbelievable, were announced. Any time you want to Stop the search, all have to do is press enter because STOP is highlighted, and go through the rigamarole of Do you really want to Stop, etc. The best part is that the next time you use photorec, you will be asked whether you want to resume the search you already started. Y + Enter. Select where you want the recovered files to be stored (c for

correct). And off it goes again...

What do you actually recover? If you start with all the file types, you'll find yourself with 50 GB or so of things in several different folders named *recupdir.1*, *through recupdir.34*, etc. depending on how many times you try things. Most of the .doc files I recovered were system files (one even weighed in at 480 MB – no hope at all of opening it with LibreOffice), several were .db, which I thought might be genealogy tables, but when I tried to open them in both Linux and Windows, I got a message they were system files. Unfortunately, at least half or more of the .jpg files were in fact pictures from ads, carpets, pants, dresses, etc., of absolutely no interest. BUT 190 bona fide photos were recovered, although some of them are doubles.

As to the huge *recup_dir* folders, there seemed to be no way to delete them. Even `sudo nautilus` wouldn't let me get rid of them. Finally (thanks to something I read in Full Circle recently), I tried `sudo su` and `nautilus` and, at last I could erase them and recover some space in my Netbook's hard drive.

To sum it all up, I guess that the keys to success with Photorec are obstinance, patience and discernment. Tomorrow, I'm mailing my friend a full CD of her lost pictures and that is what I would call a triumph: the triumph of Lubuntu, photorec, and sheer persistence.

LETTERS

Personal Finances

Re: personal finance applications: For years, I have always used Gnucash for all my banking needs. It allows you to go to your banking and "download to Quicken" which will download bank debits/credits to your Gnucash account. Setup is not difficult.

You can print reports for assets and liabilities, budget, business reports, income expenses and more.

Tom

Distro Hopping

I have been using Linux for many years, starting with Mandrake over 15 years ago. Now I use Linux Mint Cinnamon as my main distro, but have been trying to find a KDE-based distro which would give me the same stability. I have used Arch-based distros like Manjaro and KaOS, Debian-based distros, and RPM-based distros, but they all let me down at some time or other. Almost in desperation, I am now using Kubuntu 15.10, which seems pretty stable and gives me all the apps that I require, plus enough customisation to get my screen looking the way I want it.

It seems that Ubuntu-based distros are still the best and most reliable Linux distros.

Bernie Victor

Multiboot With UEFI

I read this excellent article by Frank Dennisen in FCM#102, but would like to add one word of warning, based on my own experience.

Frank advises to run fstrim during boot-up by editing /etc/rc.local. I normally schedule fstrim with cron to a time when I know I will not be using the machine.

I tried Frank's suggestion but forgot fstrim was running next time I rebooted. I then tried to suspend and the computer ignored this for a while and then went to a black screen. I hit Enter and the screen repainted and then suspended ok. When I tried to wake-up the machine, I got a terminal with a lot of messages about memory locations being unusable. A reboot fixed the problem.

Frank's suggestion will work ok but I think it is necessary to let fstrim finish before creating any disk activity. Unfortunately there is no indication of when it finishes and it can take some time; six minutes in my case.

Michael

Interview with Ebuyer

Conducted by Ronnie Tucker

If I may be so bold as to ask: how many Ubuntu PCs and laptops have you sold?

Sorry, I can't give out direct sales data, but we are delighted with the uptake of Ubuntu and its sales as it has exceeded our initial predictions. The strong figures have meant we can plan ahead to next year, opening up for more manufacturers.

How many (in number/percentage) were returned?

Again can't hand out sales data but our returns have been marginally lower on Ubuntu Laptops compared to the Window 8 equivalent in 2015.

Do you provide support for your Ubuntu machines, or do you point your buyers elsewhere for help?

The manufacturers (HP for the current range of laptops) cover the main support issues, however our in-house tech support teams have been trained to help on a wide range of common issues which are Linux specific.

Would you consider selling Ubuntu phones (from BQ/Meizu)?

We have been looking at the options for importing an Ubuntu phone into the UK, we just need to find the right distributor and price structure. We've already had a lot of interest in the BQ model from a number of customers, so

it's now down to working on a good price and partner... watch this space.

Do you ship to the USA/Canada, or outside of the UK/Europe?

Unfortunately not at the moment, we deliver to only the UK.

I notice most desktop PCs come with a DVD. Can I ask why Ubuntu isn't pre-installed?

Ubuntu is pre-installed on all the laptops we stock. However due to the current manufacturers we use for the desktops, it comes as a simple DVD install. The next batch we stock will likely come as a standard pre-install.

Why do some machines (laptops?) seem to come with Ubuntu 12.04?

Ubuntu 12.04 was simply the stock OS on the batch of HP G3 laptops we brought in. However, most people upgrade to the latest edition of Ubuntu or sometimes shift across to a different distro like Mint.

What gave you the idea to start using Ubuntu?

We used to sell a lot of products with no operating system on board, so we looked into why and found that there was a massive community for Linux systems, specifically Ubuntu. From that, we wanted to make it easier for customers, so we created a line of pre-installed models that we hoped would take off, and it did – as hardly any retailers in the UK offer Ubuntu pre-installed.

Do you have a favourite flavour of Ubuntu?

Personally, I prefer the standard Ubuntu package as it

feels closer to a traditional OS – but with the Linux freedom, I'm a bit of newbie in the Linux world, so it helps having something that is tangible to my old OS habits.

From our customer's standpoint, we've actually had a lot of comment and questions about Ubuntu due to its lightweight nature and speed. I'd be inclined to say that Ubuntu will do well over the coming year.

Where do most Ubuntu buyers come from?

A big proportion are IT buyers, as you can imagine, as well as a number of enthusiasts. Next to that, and possibly more surprisingly, a number of the older generation seem to look at Ubuntu – we think because of the costing and the easy-to-use nature of the OS.

Do you need to give more, or less, support to Ubuntu buyers?

It's difficult to manage in terms of support because, currently, the pool of customers is still small (comparatively). If, like we hope, Ubuntu sales pick up across a number of lines, we'd love to add more support.

Have you had any hardware challenges in putting together an Ubuntu PC/laptop?

Some manufactures have very strong ties with Microsoft, as you can imagine, so it's sometimes tough to get Ubuntu pre-installed. However, the companies we have spoken to about future ventures have been very open after seeing the uptake we had.

Do you plan on having more powerful Ubuntu machines available? Or would you do, say, a Ubuntu/Xubuntu range of machines?

The next batch of Ubuntu-installed machines will likely be the next generation, so yes they will be more powerful.

The overriding feedback on our first stock of Ubuntu (in 2014) was “great to see Ubuntu, but we need a more powerful laptop”. So, in 2015 we came in with a more aggressive processor and higher RAM. We’ll likely try and make the same jump this time – it just depends on the manufacturer supplying the units.

I don’t think we will move to Lubuntu/Xubuntu just yet; Ubuntu still has a long way to go, when it comes to popularity with a wider audience.

How about custom configurations with Ubuntu?

We don’t really look to do custom modification of any machines, so it’s unlikely we would do it for Ubuntu.

Do you use Ubuntu/Linux in the Ebuyer offices?

We’ve got quite a range of OSes here in the office. Our IT dev team are the biggest consumers. As you can imagine, they use a mixture of Linux distros, the most popular are Mint, Ubuntu and Debian. Marketing also has a couple of Ubuntu machines, but the rest of the company is Windows-based.

Tuxidermy

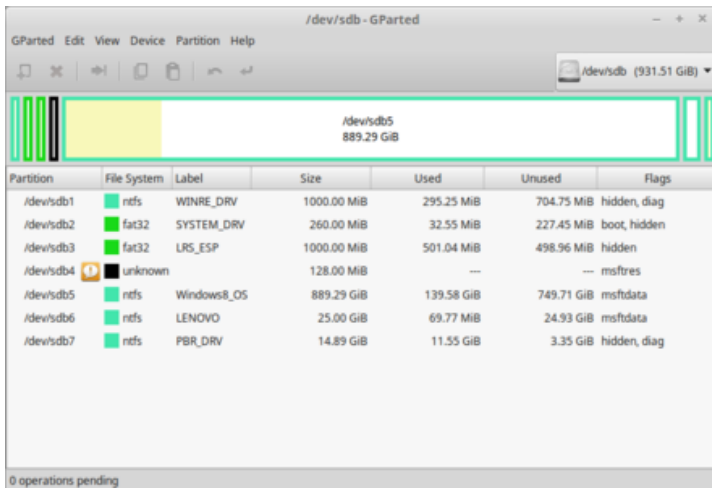
WWW.PENSADOBLOCO.COM



Q&A 103

By Gord Campbell

Q I am in the process of installing Ubuntu but the entire HDD is filled with partitions. Is there any way to figure out which partitions can safely be deleted? I've included a screen capture of the partitions.



Partition	File System	Label	Size	Used	Unused	Flags
/dev/sdb1	ntfs	WINRE_DRV	1000.00 MiB	295.25 MiB	704.75 MiB	hidden, diag
/dev/sdb2	fat32	SYSTEM_DRV	260.00 MiB	32.55 MiB	227.45 MiB	boot, hidden
/dev/sdb3	fat32	LRS_ESP	1000.00 MiB	501.04 MiB	498.96 MiB	hidden
/dev/sdb4	unknown		128.00 MiB	—	—	msftres
/dev/sdb5	ntfs	Windows8_OS	889.29 GiB	139.58 GiB	749.71 GiB	msftdata
/dev/sdb6	ntfs	LENOVO	25.00 GiB	69.77 MiB	24.93 GiB	msftdata
/dev/sdb7	ntfs	PBR_DRV	14.89 GiB	11.55 GiB	3.35 GiB	hidden, diag

0 operations pending

A (Thanks to SeijiSensei in the Ubuntu Forums)
Rather than deleting partitions, I'd use the Windows disk manager (Control Panel > Computer Management > Disk Management) to shrink the Windows partition then give the newly freed space to Linux during installation.

Q I am very, very eager to install Tails but I would like to keep my current Ubuntu 15.10 + Windows 10 dual-boot config. Is it possible to triple boot with Tails?

A (Thanks to DK1993 and Bucky Ball in the Ubuntu Forums) Tails is supposed to be used in a

live environment. It is supposed to run in RAM and delete all information when the computer is powered down. Otherwise, considering distros that are intended for installation on a hard drive, yes, you can triple-boot without issue. You just need free space on the drive to create a partition and install to it.

Q During boot up, I got this error message: USB 2/3 device descriptor read64, error -110

It was repeated two more times, then there were some other error messages.

A This sounds crazy, but it works. Shutdown your computer, unplug it for five minutes, then plug it back in and start it up.

Q My vortexbox server is unreachable. Its IP address is 192.168.1.255

A (Thanks to SeijiSensei in the Ubuntu Forums) 192.168.1.255 is the "broadcast" address for the 192.168.1.0/24 network. Both 192.168.1.0 and 192.168.1.255 cannot be assigned to hosts. Give the server a different address.

Q I want to limit how much Internet bandwidth any one user can have.

A (Thanks to matt_symes in the Ubuntu Forums) You can do traffic shaping with the command: tc

You'll want to read the man page and look at tutorials on the net as it's a big area.

Top questions at Askubuntu

- How important is the sudo password?
<http://goo.gl/8NxLe6>
- How to create a bootable .iso file from Ubuntu Live USB?
<http://goo.gl/FRsgmu>
- Delete all files except specified files/folders using command-line?
<http://goo.gl/S1LCVG>
- Get all image files with wget
<http://goo.gl/OVLx4n>
- Reinstall base Ubuntu without formatting or removing manually installed packages
<http://goo.gl/RSQWrb>
- Will Ubuntu 16.04 LTS server still use dpkg?
<http://goo.gl/mON1J4>
- Is Linux getting less or more secure?
<http://goo.gl/EOAUc6>
- 15.04 is available to update to. Will I lose my data?
<http://goo.gl/8Iz4w2>
- No version of Ubuntu can be installed with any 6th generation Intel processor
<http://goo.gl/NXEXaR>

Tips and Techniques

Cleanup!

This has little to do with Linux, but I hope it's still interesting.

My "high-performance desktop" computer is several years old. In recent months, it has overheated if asked to do anything mildly computational. Even playing a Youtube video was enough to cause a problem.

I could tell this, because Conky, combined with lm-sensors and hdd-temp, displays all the temperatures all the time. The computer has a "production" partition and a "test" partition, and they each have Conky installed to tell me what I want to know.

Eventually, I broke down and addressed the problem. Open the case, take the CPU heatsink and fan out, and give them a good cleaning. I also noticed that the "thermal paste," which connects the CPU to the heat sink, had broken down. New thermal paste, install the heatsink and fan again, button up the case, and all is well.

This is not a job for the faint-of-heart! If you are concerned about tackling it, take your computer to a trusted tech, and be prepared to pay a reasonable service fee. \$100 is not too much. Why? Because even the most competent service person will occasionally have a slip of the fingers, and now we're talking a new motherboard, CPU and memory. Not cheap.

In my specific case, it worked beautifully. My CPU now idles at the same temperature as me, and even when rendering video, gets nowhere close to "too hot." Once again, I have a "high-performance" computer.

Aside: in my test partition, I upgraded Xubuntu 15.04 to 15.10, and it went flawlessly. That's where I am writing this column.

Using QR codes with Ubuntu

by Alan Ward

QR “Quick Response” codes are fast becoming a popular means of communicating snippets of information from a printed medium or other physical surface towards computers and mobile devices. They were originally developed as a replacement for the single-dimension bar code by a team from the automotive equipment design and manufacturing company Nippon Denso Co. Ltd. (日本電装). The increase in the amount of different car parts handled gave rise to a desire to augment correspondingly the amount of data that could be stored on the printed labels that were used to identify the boxes in storage and during transport.

Since 2006, the working principles have become the ISO/IEC standard 18004:2006, and so can be seen as a recognized industry technique. The team behind this design (Masahiro Hara, Motoaki Watabe, Tadao Nojiri, Takayuki Nagaya, and Yuji Uchiyama) won the European Patent Office 2014 Popular Prize for their efforts (<http://www.epo.org/learning-events/european-inventor/finalists/2014/hara.html>).

Nowadays, QR codes are widely used in situations in which it is desirable to present printed matter containing links to electronic information, in a way that is easy for a computer to read in. Examples include applications such as a bus-stop transportation map that includes a QR-encoded link to the company’s web page to get up-to-date information on scheduling, a poster for a music festival with a QR-enabled link to the online ticketing service, or train or aircraft tickets with QR codes that are read at the entrance stile to enable access to boarding.

At the same time, the folks in graphics design have been making use of the fact that data is actually redundant inside the code; the image can be modified in various ways and still convey useful information to the reader. A recent example from 2014 is the “Guinness QR cup” by BBDO New York that has won a Caples award (<http://www.caples.org/guinness-qr-cup-0>). The idea refers to a Guinness beer glass with a printed QR code, that is readable only when the glass is still full of the black stuff: only the white dots are actually printed, while the black dots are the beer itself showing through from behind.

In this article, we will see how to read and create QR codes in an Ubuntu system using various programs. Before continuing, it should be noted that several other similar systems can be found, such as Data Matrix barcodes (https://en.wikipedia.org/wiki/Data_Matrix) and Aztec codes (https://en.wikipedia.org/wiki/Aztec_Code). Though each of these systems is popular in places, QR codes seem, for the time being, to be the best supported, both by Ubuntu and applications on mobile devices.

THE ANATOMY OF A QR CODE

Let us consider a specific example:



As can be seen, a QR code is in fact a two-dimensional square matrix of dots (pixels), that, in essence, are binary zeros and ones. This is in fact about the only time a modern user of computing equipment will have the chance to get intimate with binary code since it is often obscured by the various layers of software in between.

When a QR code reader is placed before this image, the first parts that are detected are the three positioning marks emphasised in gold. These give the camera a basic idea of the position of the the QR code, as well as its orientation. The small mark in red also helps understand alignment; there is only one of these on small QR codes, but larger codes use a repeating pattern to ensure coherence across the width and height of the image.

QR codes may be of varying widths, expressed in the number of dots used. However, this has nothing to do with the actual physical size of the image, nor to the resolution of the photograph the reader has taken of it. So the second stage in code interpretation is to figure out

how many dots are being used in this particular code. To do this, a simple repeating pattern of black and white dots is placed between the orientation marks (shown in green). This “timing” pattern is easy for the reader to interpret, and so figure out the number of lines and columns in the mesh.

The rest of the dots correspond to a mix of QR code version information, format information, the actual data, and error correction codes. Error correction is necessary, since cameras do not always give a clear image of the code area (due to the presence of dust, scratches on the lens, etc.), interpretation may also get some dots wrong (if colors are not correctly detected), and motion blur if the camera is not held perfectly still at the time.

Error correction in QR codes uses a branch of Reed-Solomon error-correcting codes. With a bit of (perhaps over-) simplification, these codes can be seen as basically repeating all information more than once. Redundancy is calculated in such a way that not only can errors be detected, but also corrected upon reading. With sufficient extra bits added to each data word, more than one single error can be detected - unlike more simple schemes in which two errors in the same word could go undetected.

Nowadays, the details of how the error detection and correction are handled go quite under the radar of the human user. Software (on most consumer-grade devices) or hardware (in industrial applications) take care of this part and simply give us the decoded information in readable form.

In fact, the addition of superimposed colors to the QR code above has not made it unreadable - if you have a QR reader or application available, go ahead and see what it says!

SOME SOFTWARE

There is in fact a selection of software available in the Ubuntu repositories to create QR codes. One of the most basic is `qrencode` from the `apt` package with the same name. This is a console-only program. For example, to encode the web page address of our favorite magazine, simply issue:

```
$ qrencode -o qr-example1.png http://fullcirclemagazine.org/
```

This creates the image `qr-example1.png` in the current directory:



`qr-example1.png`

The same program can also create QR codes in a variety of formats. One of particular interest is SVG. The corresponding command would be:

```
$ qrencode -o qr-example1.svg -t SVG http://fullcirclemagazine.org/
```

In the other direction, the `zbar-tools` package contains programs to handle converting a QR code read in from the camera (`zbarcam`) or from an image file (`zbarimg`). For instance:

```
$ zbarimg qr-example1.png
QR-Code:http://fullcirclemagazine.org/
scanned 1 barcode symbols from 1 images in 0.02 seconds
```



On the graphical side of things, perhaps the best known application for Ubuntu is QtQr. Using the Qt library on which the KDE desktop is based, this program also works quite well under other desktop managers, being sufficiently integrated to include dragging files to and fro.

The software contains a complete QR code generator, where the user can not only specify the type of information to be encoded (URLs, but also other structured information such as personal contact information, georeference or even WiFi network details), but also the dot size in pixels, margin width and level of data redundancy to be used.

QtQr reads in QR codes either from image files, or by accessing the computer's webcam if available. This is handy to read in data from a mobile phone, without needing to set up wireless communication (Bluetooth or similar).

EDITING QR CODES

Once a QR code has been created, some editing can take place without altering the information contained within. To take an example, I will take the “<http://fullcirclemagazine.org>” QR above, in SVG form. As line-art, it can then be imported into a vector editing program such as Inkscape and modified to suit our needs. Opening it with Inkscape, the first thing we notice is that the white background has been grouped together with the black markings. We can select the complete assembly and hit Ctrl-Shift-G to ungroup them.

The black markings themselves are also individual rectangles that have been grouped together. If we wish to alter individual pieces, they will also need to be ungrouped first. For our examples, however, we will keep them together in one piece.

The first thing we can do with the black markings is to change their color. Select the markings, then choose Object > Fill and Stroke in the menu. We can play around with the fill color, and add blur for artistic effect.



qr-example2.png

QR codes are sufficiently robust that even relatively light colors can be used, and still function as a code. However, one should not try to go too far - ‘too far’ being colors with little contrast to the background, or a combination of light and dark colors. These do not work

well with most QR readers. If we do stay within these parameters, some effects such as gradients are possible. To apply these, select the markings, and in the Fill dialog choose Gradient fill. You will need to edit the gradient end-points to make sure that both of the colors used to build the gradient are sufficiently contrasted with the background. Some experimentation may be needed for good results.



qr-example3.png

In Inkscape, photographs may be used as patterns to fill in areas. The image (JPG, PNG or similar) is imported, then converted into a pattern using menu option Object > Pattern > Objects to Pattern. The black markings in the QR code are then selected, and filled with the new pattern. As before, it is best to use images with similar and rather dark colors - and no very light-colored spots in them (if using a white background).



qr-example4.png

On the other hand, very light images can be used to color the markings, on top of a dark background. Alternatively, a single color can be used for the markings, which are then placed on top of the image. As long as there is enough contrast for the QR reader to detect the markings correctly, just about any combination can be tried out.



qr-example5.png

This is about as far as one can go with this low-redundancy level QR code. However, if a high level of redundancy has been specified when creating the code, large areas of dots can be covered up with other graphical information. Although this will give some errors on reading, the error-correction codes used will still enable the reader to establish the original message. There are some areas of the code that must not be touched. As

described in the previous section, positioning, alignment and timing marks are necessary for good operation. Altering version information is probably not a good idea either. But if we stick to the central part of the code, we can take some liberties without going too much into the danger zone:

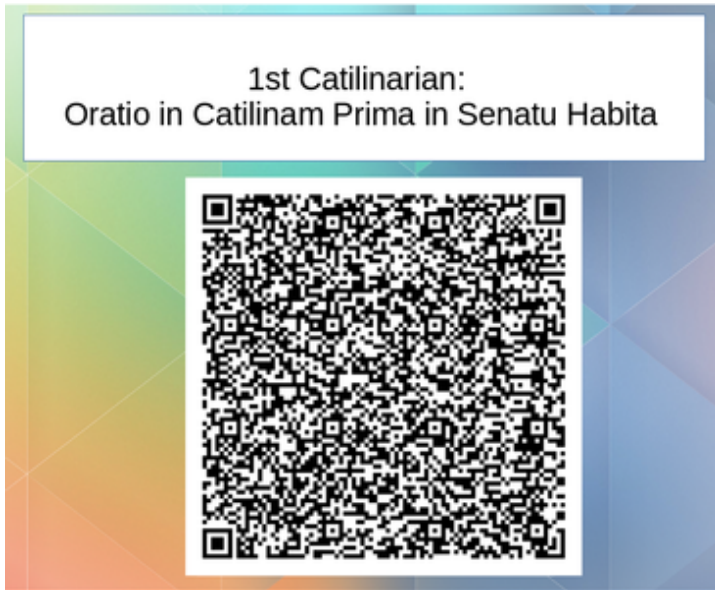


For further ideas on how to use Inkscape, Mark Crutch's ongoing series in FCM is probably the place to start - try the Special Edition Vol 1 (<http://fullcirclemagazine.org/inkscape-special-edition-volume-one/>), specifically Part 5 for details on how to fill regions.

COLOPHON

I would like to end with a couple of practical use-cases that go a bit further than adding dynamic content to commercial posters. In my day job as a teacher, I often give students pointers on where to obtain further information, if necessary, on the topic being studied. For some time now, I have been projecting slides with the

relevant URLs. However, even when using shortened URLs (“tiny” URLs), copying mistakes are made all too often. Including the relevant URLs in QR form makes it possible for students to come up to the screen and “shoot” the codes with their mobile phones - thus acquiring the link without any human error. They always carry the darn things around with them, so we might as well make good use of them, right?

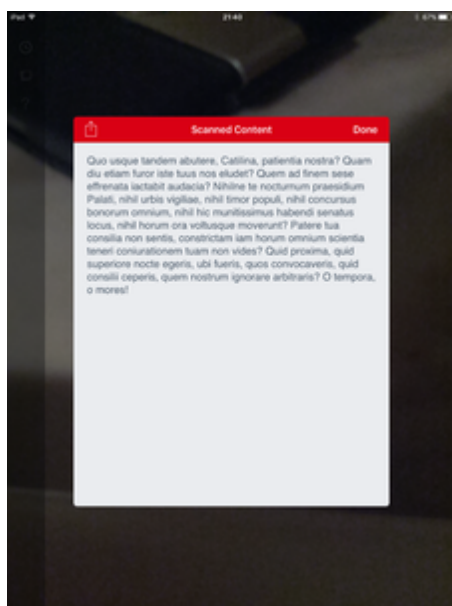


A second use of QR codes is to pass along short quotations from texts. QR codes are well able to hold several paragraphs of text, about what would be useful for a single study period. So, for example, Cicero’s classical discourse against Catalina could be studied in extract form. The original text goes:

“Quo usque tandem abutere, Catilina, patientia nostra? Quam diu etiam furor iste tuus nos eludet? Quem ad finem sese effrenata iactabit audacia? Nihilne te nocturnum praesidium Palati, nihil urbis vigiliae, nihil timor populi, nihil concursus bonorum omnium, nihil hic

munitissimus habendi senatus locus, nihil horum ora
vultusque moverunt? Patere tua consilia non sentis,
constrictam iam horum omnium scientia teneri
coniurationem tuam non vides? Quid proxima, quid
superiore nocte egeris, ubi fueris, quos convocaveris, quid
consilii ceperis, quem nostrum ignorare arbitraris? O
tempora, o mores!”

Transformed into a slide for presentation to the class,
once scanned, the QR code would then appear as shown
(on the student’s tablet):



The text can then be sent off to Google Drive or a note-taking application, and -one hopes- also be worked on.

As a side note, we can see through this example that QR codes are system-agnostic, and thus a good way of passing information between operating systems - even though some of them may be rather less open than Ubuntu.

Author biography: Alan teaches computer science at Escola Andorrana de Batxillerat (high-school). He has previously given GNU/Linux courses at the University of Andorra and taught GNU/Linux systems administration at the Open University of Catalunya (UOC).

Linux Loopback 4

by SJ Webb

As the 1960's developed, Bell Labs grew. Ali Javan developed and operated the first gas laser. Metal oxide semiconductor and integrated circuits laid the groundwork for our current info society. Soon a carbon laser was developed. Unix was born in 1969. Aaron March was the first graphic designer to create a barebone GUI for computer systems.



These quick changes led to the 1970s'. Dennis Ritchie compiled the C computer language which was used to rewrite part of Unix. Fiber Optic cables were developed and tested in Atlanta, Georgia. The first 32 bit microprocessor was developed. Numerous other telephony devices were created. Bell Labs undoubtedly was a mecca of technology genius in this time frame.

However this time frame ended in 1984. The U.S. federal government broke up ATT due to its sheer monopoly on phone lines. This led to Western Electric becoming the sole owner of Bell Labs. Western Electric was now called ATT Tech.

Plan 9 was a new OS meant to replace Unix in 1985. Later on the Inferno OS was developed to refine Plan 9. There was slow but steady growth in developing new technology. In 1996 ATT Tech changed its name to Lucent Technology. Under the new name the first organic laser was developed and plastic transistors. In 2006 Lucent Technology and Alcatel merged under the name of Bell Labs.

This merger led to downsizing. The research center will only begin to start focus on profit centers. Therefore in 2008 emphasis was given to network development, high speed electronics, nanotech, and software. The lab lost its sense of direction due to goals of profit. In 2013 the lab realigned itself to its earlier roots of information and communication technology. In April of 2015 Nokia bought the parent company of Bell Labs, and by default Nokia acquired the sleeping giant of technology. Hopefully Nokia will help lead Bell Labs down the path of awe again.

Ubuntu Games

Middle Earth: Shadow of Mordor

Oscar Rivera

One game to rule them all! Tolkien's Middle Earth is a vast insatiable world of fantasy and adventure. Most people today are familiar with The Hobbit and the Lord of the Rings trilogy, but, somewhere in between, there is a new adventure that has recently been released as a video game. Best described as a single-player, third-person, open-world, action-adventure RPG, Middle Earth: Shadow of Mordor takes place in the time period after Tolkien's The Hobbit, but before The Lord of the Rings trilogy.

In September 2014, Middle Earth: Shadow of Mordor was first released for PC, PS4 & Xbox One. Subsequently, it was also released for PS3 & Xbox 360 later that year. Most recently, in July 2015, Shadow of Mordor was released for Linux. Immediately following its Linux release, word began to spread around the Linux community that this game was a must-have. Shadow of Mordor began to appear in just about every list of top-ten must-have new releases with many publications & websites nominating and/or electing it as Game of the Year. The list of accolades includes GDC Game of the Year, Gamespot's Game of the Year, and gamesradar Game of the Year – to name just a few. Gaming on Linux claimed that it was a “rare (Linux)... high-quality open-world game... which had delivered something special.”

After reading so many rave reviews, I couldn't help but buy it so I could decide for myself whether this game was worth everything critics claimed it was. I was not the least bit disappointed. Developed by Monolith Productions,

published by Warner Brothers Interactive Entertainment, and ported to Linux by Feral Interactive, Middle Earth: Shadow of Mordor gets my vote for Linux Game of the Year. It was rather difficult for me to put the game down in order to write this review; that's how good the game is.

To play the game, you can download it from Steam or Humble Bundle for the current regular price of \$49.99 unless you happen to catch a sale anytime in the near future which is not out of the question. Once installed, you're ready to play. Shadow of Mordor has been described as a cross between the Assassin's Creed and the Arkham Batman series of games. Having previously played games from both of those series, I can testify that such claims are accurate. Anyone who has played any of the Assassin's Creed or Arkham Batman games will feel right at home playing Shadow of Mordor. However, Middle Earth: Shadow of Mordor goes above & beyond anything else ever developed as it has been injected & infused with enough creativity & innovation to stand on its own as a uniquely phenomenal game that no gamer should do without.

As the game begins, Talion (the main character), witnesses his family being murdered by cold-blooded Orc warriors fighting for the Black Hand of Sauron. As the opening sequence plays out, Talion himself is murdered by these savage Orcs but his soul is unable to join his family in the afterlife. As he is savagely murdered, Talion somehow merges with an Elf Wraith who is also out for revenge against the Black Hand of Sauron. Having been magically united, Talion and the Wraith embark on a dark journey that will take them through Mordor as they kill Orcs, Uruks, chiefs, captains and all sorts of beasts, animals & monsters on their quest to exterminate the Black Hand of Sauron and anyone who gets in their way. Along the way, Talion also co-operates with other characters such as Ratbag, the Uruk who Talion helps

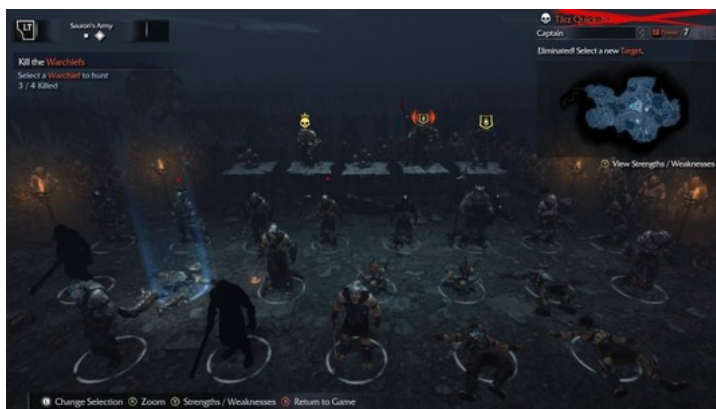
become war-chief, and we even work alongside Gollum who is dying to obtain his “precious ring.”



Talion can engage in melee, ranged & stealth combat at the outset of the game. As the story unfolds, Talion acquires other combat skills that enhance his three primary fighting styles via the use of runes and learned abilities. When you kill enemies, especially chiefs & captains, Talion earns points and runes, but it is up to you to decide which abilities will be mastered – which is what gives the game its RPG element. There are two sides to Talion, the regular human side and the wraith-like side – which are both upgradeable depending on your playing style. You control Talion either through mouse/keyboard or a game controller, both of which work very well on this game; the choice is yours. What really sets this game apart from anything that has ever gone before, is what's been referred to as the Nemesis system. Basically, when an opposing enemy kills you in this game, not only do you die and have to re-spawn at a predetermined forge tower, but the character who killed you, and any other allies who might have been with him when you died, will level up (ie, increase their level number) and use your death to their advantage. The way in which the developers incorporated this concept into the game is truly fascinating. The Nemesis system is dynamically creating a

living Mordor which breathes and pulsates according to your actions – thus presenting you a soon-to-be wasteland tailor made for you.... by you.

For example, there was a captain in the first half of the game who I couldn't defeat – no matter how hard I tried. When I first encountered him, he was a level 13 at a time when I was just getting comfortable at fighting against level 8 enemies. With each death I suffered against him, not only would he level up, but also his strengths would increase while his weaknesses decreased. Eventually, he was so powerful (lvl 18) that I opted to avoid him at all cost until I felt I was powerful enough to bring him to his knees. When I finally chopped off his head, he had risen to level 20 and just before my sword sliced through his neck he even said something like “at long last you've defeated me.” I couldn't help but laugh at his comment and marvel with a dropped jaw at how this particular captain who I had helped turn into an unbeatable foe, even remembered my playing style and how many times he'd killed me, among other things. If I call the Nemesis system genius, I'm still short of giving it the credit it deserves. I wouldn't doubt to find influences of the Nemesis system in future games still to come.



On my system, Shadow of Mordor had very few

glitches, if any at all. A couple of times I had to re-start the game with lower default settings, but I'll be the first to admit that these were not so much bugs, but rather me trying to push my system beyond its limits. The game isn't to blame. The graphics on the game are not next generation but the fluidity with which the visuals move in & out of battle, especially during combat-finishing moves, are very pleasing to the eye. The voice acting is another in a long list of strengths. Shadow of Mordor also comes with a benchmark which you can run to test your system. If you are interested in taking screenshots of the game, there's even a feature that can be enabled/disabled which can potentially turn you into a real visionary screenshot publishing artist.

If enabled, the game can be paused at will and a wide array of tools appear before you to alter the paused screenshot and turn it into a visual masterpiece. You can completely change the angle, add a border, focus in/out of it, get up close or far back, change the "canvas" as it were, make it black & white, sepia, etc. It's a feature I found quite useful.

Rather than continue talking about all of the things I've enjoyed about this game, it's best I say that I've seriously been thinking about any negative aspects of the game and cannot come up with anything I dislike about it. Although I'm not affected by it, I must unfortunately report that Intel & AMD graphics are not yet supported, but I understand that the game should still work fairly well on very low settings. It would be a shame if support for AMD & Intel didn't come soon. I had to contact Feral Interactive regarding compatibility problems I had while playing this game with Valve's new Steam Controller, and they promptly replied and gave me some valuable advice.

Feral Interactive has done a superb job in bringing this title to Linux and I cannot think of a better way to thank

them other than buying Shadow of Mordor. I give the game a solid rating and strongly recommend it to everyone.... or rather to all Mature Audiences who are age 18+ since that's the game's well deserved rating as it is rather graphically violent.



5 out of 5 stars.

Minimum Requirements:

- OS: Ubuntu 14.04.2 64-bit / SteamOS
- Processor: Intel Core i5-750, 2.67 GHz | AMD Phenom II X4 965, 3.4 GHz
- Memory: 4 GB RAM
- Graphics: 1GB NVIDIA 640 or better with driver version 352.21 or later
- Network: Broadband Internet connection
- Hard Drive: 47 GB available space
- Additional Notes: AMD and Intel cards are NOT supported.

Oscar graduated with a music degree from CSUN, is a Music Director/Teacher, software/hardware beta tester, Wikipedia editor, and active member of the Ubuntu community. You can follow him at:

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Patrons

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